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US Army Corps of Engineers
Waterways Experiment Station

Computer Applications in Geotechnical Engineering (CAGE) Project

User's Guide for the Boring Log Data Manager, Version 2.0

by Keith Nash
Nash Computing Services

Approved For Public Release; Distribution Is Unlimited

Prepared for Headquarters, U.S. Army Corps of Engineers

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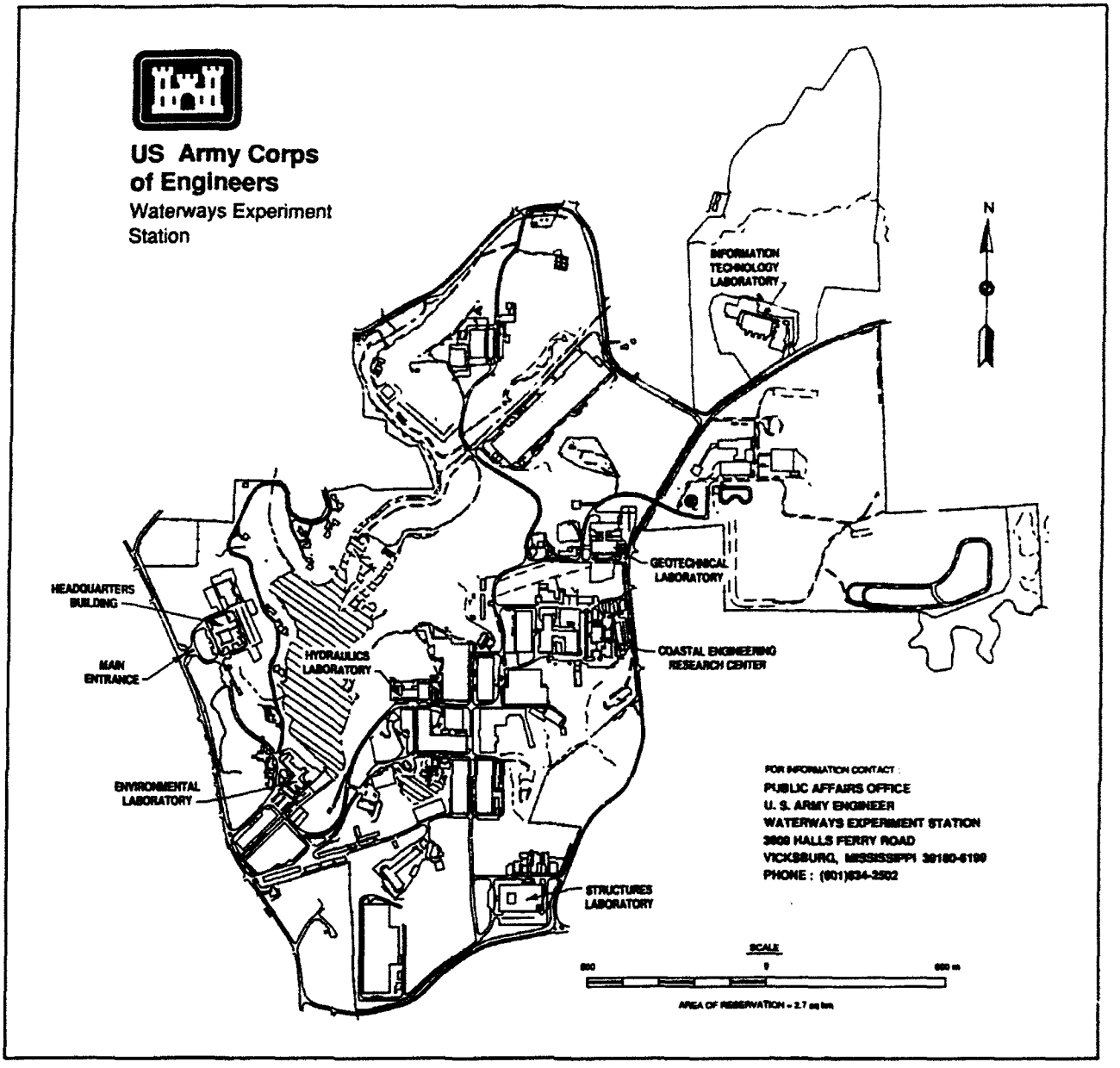

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PREFACE

The U.S. Army Engineer Waterways Experiment Station (WES) contracted with Nash Computing Services (NCS) to research, design, and develop a Boring Log Database Manager (BLDM) as a database management and site characterization tool for use by geotechnical engineers. The PC-based BLDM program allows users to maintain a complete boring log database for multiple projects. The system can be used to create data files for use with the Intergraph INSITU system. In addition, BLDM has the capability of creating boring log plates in MicroStation design file format using Corps-standard soil and rock symbology. These design files may be modified and plotted on any Intergraph platform (i.e., PC's or UNIX workstations running MicroStation or VAX minicomputers running IGDS). BLDM combines the functionality of the Boring Log Database System and Boring Log Design File Builder, two separate geotechnical applications programs formerly available from WES.

The BLDM programs and this User Guide were written by Mr. Keith Nash (NCS). Mr. Earl V. Edris, Jr., P.E., Soil Mechanics Branch (SMB), Soil and Rock Mechanics Division (SRMD), Geotechnical Laboratory (GL), WES, was the Contract Monitor. Mr. Chris Dixon, P.E., (Tri-Services CADD/GIS Center, Information Technology Laboratory, WES), Mr. Pat Conroy, P.E., (St. Louis District), Ms. Linda Wichlan (St. Louis District), and Ms. Brenda Scott (Little Rock District) reviewed the program and were invaluable in providing assistance and suggestions for improvements during the project. The author gratefully acknowledges all of these individuals, as well as the helpful assistance of Ms. Norma E. Logue and Ms. Emma Cessna of the WES Contracting Division.

This program development is part of the Computer Applications in Geotechnical Engineer (CAGE) project sponsored by the Headquarters, US Army Corps of Engineers (USACE). The USACE Technical Monitor is Mr. Art Walz, Chief, Geotechnical and Materials Branch, Directory of Civil Works, Engineering Division. The CAGE project's Principal Investigator is Mr. Edris. The development of this CAGE package was accomplished under the supervision of Mr. W. Milton Myers, Chief, SMB, Dr. Don C. Banks, Chief, SRMD, GL, and under the general supervision of

Dr. William F. Marcuson III, Director, GL.

At the time of publication of this report, Director of WES was Dr. Robert W. Whalin. Commander was COL Leonard G. Hassell, EN.

PART I: PROGRAM OVERVIEW

Overview

1. The Boring Log Data Manager (BLDM) is a PC-based boring log database management system and site characterization tool. It allows users to: (1) create and maintain project boring log data, (2) print summary and detail reports, (3) create data files compatible with Intergraph's INSITU system, and (4) generate boring log design file plates for plotting or display on any Intergraph CADD platform. Figure 1 shows how this package fits into the work flow for creating finished boring logs from field data.

2. BLDM is a PC-based menu-driven program and is very easy to use. Context-sensitive help is available to provide detailed information about the function of each menu or data entry form. Users may efficiently select and manipulate projects and borings with a minimal number of keystrokes. The PC system requirements and instructions for installing BLDM are contained in Appendix A.

3. BLDM stores boring log database information in the industry-standard xBase file format and the data files are completely compatible with the dBase III file specification. Thus users may use any xBase-compatible product to perform *ad hoc* inquiries, generate special reports, etc. The data file structures are documented in Appendix B. BLDM is a stand-alone system and does not require dBase III or any other xBase-compatible file management system in order to operate. However, to generate the boring log design file plates for use with any Intergraph CADD platform, the PC MicroStation resident handlers must be loaded into memory prior to running BLDM.

4. BLDM is supplied with a utility for converting data files in the older Boring Log Database System and BLDM v1.x formats. See Appendix F for more information about converting and using these files with BLDM.

5. BLDM is highly configurable. Users have complete control over the soil and rock symbology, drilling methods, test types, color definitions, modification symbols, and consistency symbols used to maintain boring log data.

6. Intergraph INSITU data files created using BLDM adhere to the short keyword specification. Each boring is removed before being added to eliminate the

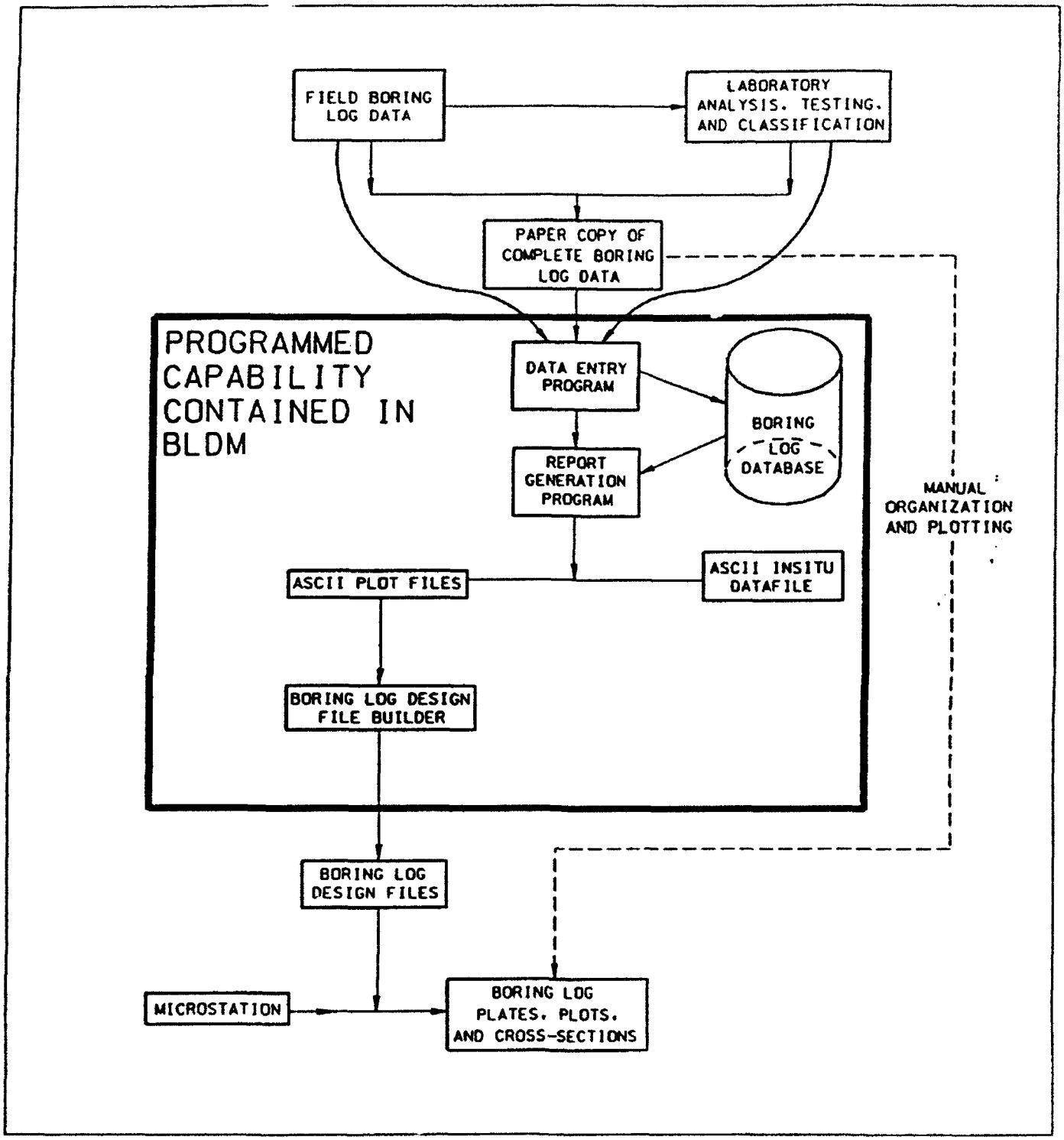


Figure 1 Boring Log Data Work Flow

possibility of duplication. BLDM makes it possible for users to perform data entry on low-cost PC systems rather than the more expensive Intergraph workstations.

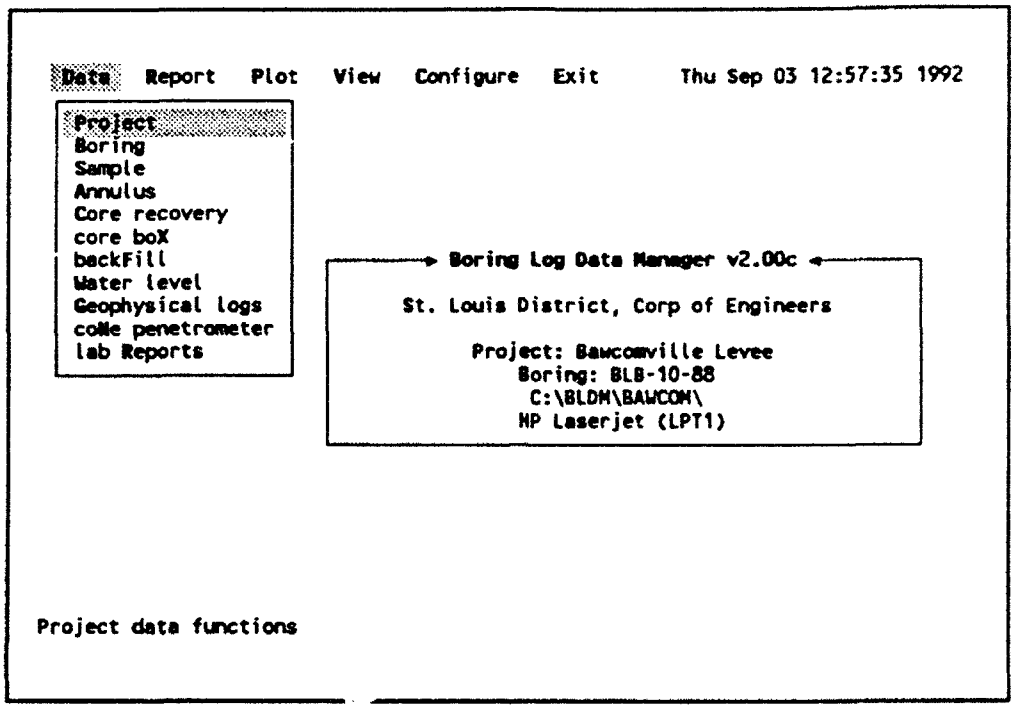
7. BLDM may be used with MicroStation v3.3 to create boring log design file plates. Limited support for MicroStation v4.x is also provided but, because of errors in the Intergraph/Bentley MicroCSL programmer's library, patterning of boring strata is not available. Users may configure the system for their specific needs by specifying the seed design file and cell library to be used, margins and title block sizes for each of the supported ANSI plate sizes, and the intended output device (laser printer, pen plotter, or electrostatic plotter). In addition, users may specify the text sizes used for borings, the font, weight, height, and width for each of six lines of title block text, and a table of line weights to be used by each of the three supported output device types (laser printer, pen plotter, or electrostatic plotter). The intermediate data file format used by BLDM to create boring log design file plates is described completely in Appendix B. Design files produced by BLDM adhere to all applicable Corps geotechnical standards with respect to scaling, plate size, cell library, and soil and rock symbology and may be utilized on any Intergraph CADD platform, including PC, UNIX, or VAX workstations. BLDM produces design files with working units of feet, inches, and 8,000 positional units (1:12:8000). Plate sizes available include the ANSI-standard A (horizontal and vertical), B, C, D, E, and F specifications.

8. BLDM uses a slightly modified copy of the GEO.CEL geotechnical cell library for patterning soil and rock strata and for generating arrows, water table depth indicators, and various other symbols. Users may, however, use another cell library if this is deemed necessary, provided the alternate cell library contains the required cells. Appendix D contains a full listing of all cells currently used by BLDM.

The BLDM Screen

9. The BLDM screen shown below contains several items of interest. The window at the middle-right of the screen is called the status window. The title at the top of the status window shows the name of the program and the version number. The name of your organization, intitially entered at the time of installation, is centered in the

middle of the status window. The current date and time appears at the upper right of the main menu bar and is updated every second while the program is running. The currently selected project directory, project, boring, and printer are displayed in the lower portion of the status window.



BLDM Screen

Using Menus

10. The main menu appears at the top of the BLDM screen. The BLDM main menu has six selections: *Data*, *Report*, *Plot*, *View*, *Configure*, and *Exit*. *Exit* simply exits the program and returns to DOS. The other selections invoke sub-menus and are described in detail later in this User Guide. You navigate between main menu items by using the left and right cursor keys. The up and down cursor keys scroll through the sub-menu choices under each main menu item. Notice that the *Project* sub-menu item under *Data* is highlighted: this means that pressing **ENTER** would select it for processing. Alternatively, menu items may be selected by pressing the item's selection character. This character, usually the first character of the item's name, is displayed on the screen

with a unique color so that it is easy to find. Notice also that a short description of what the *Project* sub-menu does appears on the last line of the screen. This line is called the message field, and is constantly updated to show what the currently highlighted menu item does. Throughout the rest of this manual, menu items will be shown in italics, and sequences of selections will be specified this way: *MenuItem->SubMenuItem*, to indicate a given main menu and sub-menu choice.

Data Entry Forms

11. BLDM uses data entry forms to allow you to enter information. The left and right cursor keys (←,→) allow you to scroll back and forth within a field. The **TAB** key and up and down cursor keys (↑,↓) move to the previous or succeeding field in multi-field forms. Pressing **ESC** aborts the data entry form and returns you to the calling sub-menu item. Several BLDM data entry forms require you to press **F10** in order to process the data. Others begin processing when you press the **ENTER** key. BLDM displays information in the message field indicating if **F10** is required for a particular data entry form. All PLDM fields which are logical in nature may be toggled between "yes" and "no" responses by pressing the space bar.

Choice Lists

12. Some BLDM data entry fields have choice lists of available valid entries. In some cases you may either key data directly into the field or press **F2** to bring up the choice list and make a selection. Only the items in the **F2** lists can be keyed into the fields. Fields that do not allow keyboard data entry (e.g., project or boring selection) automatically put up a choice list without requiring you to press **F2**. Select a choice list item by highlighting it with the up and down cursor keys (↑,↓) and pressing **ENTER**. Press **ESC** if you do not wish to make a selection. BLDM will indicate in the message field that the **F2** key may be used if a choice list is available for a given data entry field.

Help

13. You can obtain context-sensitive help anywhere in BLDM by pressing the **F1** key. BLDM will display help information in a window on your display screen. You may scroll through the help text with the cursor keys, or press **ESC** or **ENTER** to exit the help system. The most informative help about program functionality is available at the menu level. Invoke help from within a data entry form to find out what commands and keys are available.

MicroStation Considerations

14. BLDM was designed to adhere to Corps of Engineers standards contained in EM 1110-1-1807[1] pertaining to the use of MicroStation design files and cell libraries. The seed design file which you use with BLDM should therefore conform to these standards, particularly with regard to working units. BLDM uses the standard working units of feet, inches, and 8,000 positional units (1:12:8000). Cells are scaled by a factor of 12.0 when patterning, according to Corps specifications. This means that cells in the cell library you specify must have been created at a scale of 1 inch = 1 inch. The seed design file and cell library distributed with BLDM both meet these requirements, so the safest approach to customizing BLDM would be to modify copies of these files.

15. Note that the MicroStation resident handlers (part of the MicroStation software package) must be loaded into memory prior to running BLDM. This may be accomplished by running MicroStation before executing BLDM, or by modifying a copy of the USTATION.BAT file and replacing the MicroStation call with a call to BLDM.EXE. See Appendix A for more information about installing and running BLDM.

16. BLDM is distributed with executables for both MicroStation v3.3 and v4.x, but, as noted earlier, patterning of boring strata is not supported under MicroStation v4.x

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[1] Headquarters, Department of the Army. 1990. "Standards Manual for U.S. Army Corps of Engineers Computer-Aided Design and Drafting (CADD) Systems," Engineering Manual 1110-1-1807, Washington, DC.

because of errors in the MicroCSL programmer's library. However, drawing files created under v3.3 handlers are directly loadable into MicroStation v4.x. The BLDM *Configure->MicroStation* sub-menu provides a means for you to change the version of MicroStation used by BLDM if this should ever become necessary.

PART II: DATA MENU

Overview

17. BLDM organizes borings by project. Information relevant at the project level (e.g., project name) is maintained in the **BLDMPROJ.DAT** system file using the *Project* sub-menu. Each project has an associated directory where BLDM stores its data files. Every project also has a data filename specification. This filename specification, which may be up to seven characters in length, is used to identify the project data files. The project directory and filename, when combined, must be unique for each project. Thus, for example, you may use a single directory for several projects, as long as each of the project's data filename specifications are unique. However, the recommended approach is to use a separate directory for each project. This reduces confusion and simplifies file maintenance because all of a project's database files, plate data files, INSITU data files, and plate design files are written to the project directory.

18. Project boring data are stored in 13 data files formed using the data filename specification. These files are named ***nnnnnnnt*.DBF**, where ***nnnnnnn*** is the data filename specification, ***t*** is a single-character tag which indicates the type of data, and **DBF** is the standard xBase data file extension. For example, sample data are stored in files named ***nnnnnnn*S.DBF**, where ***nnnnnnn*** is the data filename specification, **S** indicates 'sample', and **DBF** is the standard xBase data file extension. Similarly, boring data are stored in files named ***nnnnnnn*B.DBF**, where ***nnnnnnn*** is the data filename specification, **B** indicates 'boring', and **DBF** is the standard xBase data file extension. Other data type tags include **P** (piezometer), **A** (piezometer annulus), **C** (core box), **R** (core recovery), **U** (sub-strata), **F** (backfill), **W** (water level), **T** (field and lab tests), **G** (geophysical logs), **N** (cone penetrometer), and **L** (laboratory report). BLDM maintains index files with the same filename and the standard xBase **NDX** extension for all of the data files except borings. The data files are stored in the project directory you specify when adding the project. Appendix B contains file structures for all of the BLDM data file types.

19. You must select a project before BLDM will allow any operations on borings. Similarly, you must select a boring before BLDM will allow any operations on

samples. BLDM makes sub-menus available for selection only when you have selected a working project and boring. This is because many operations are inappropriate unless you have specified these items. For example, it makes no sense to print a report on a project's borings if you have not selected a project.

Project

20. The BLDM *Project* menu allows you to select a project, edit the current project, add new projects, or delete projects from the BLDM system.

Select

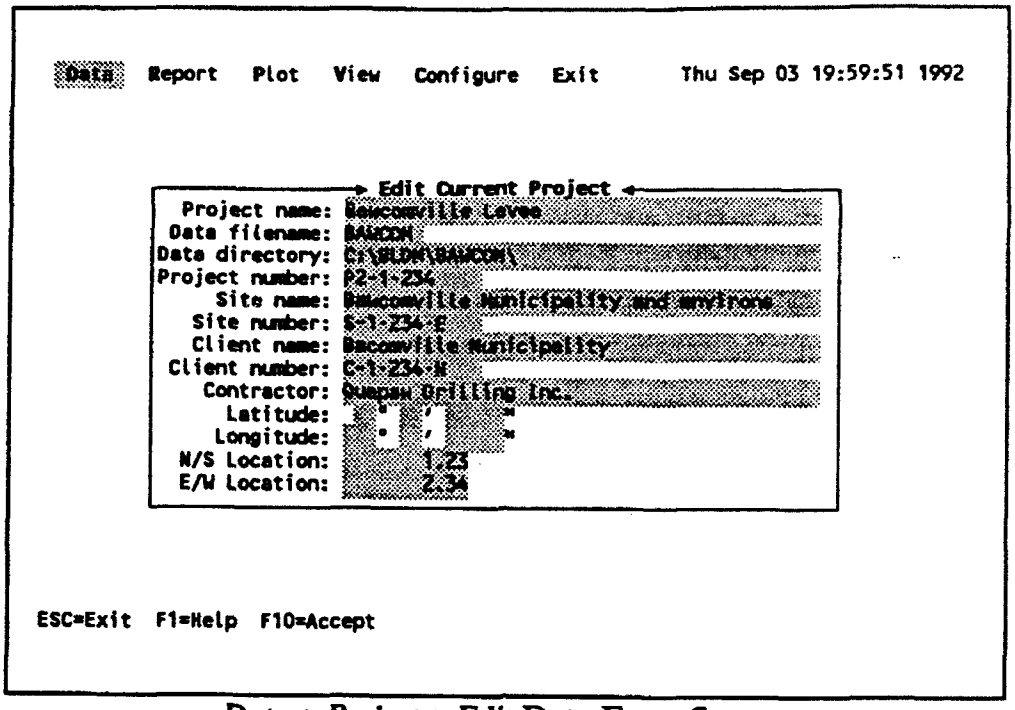
21. This sub-menu allows you to select a project from a choice list of all existing projects. After you select a project, BLDM will open its data files for further processing. The project's name will appear in the status window and sub-menus which are only appropriate when a project has been selected will be made available.

Edit

22. This command invokes a form (shown below) which allows you to edit the currently selected project's data. Be aware that BLDM will rename and/or move a project's data files if you change the project directory or data filename fields.

Add

23. Use this command to add new projects to the BLDM database. BLDM presents a form identical to the one used to edit project data. You then specify the project's name, directory, data filename specification, etc. BLDM will create empty boring and sample data files for the project in the directory specified. If the files already exist, BLDM will verify that you wish to use them before continuing.



Data->Project->Edit Data Entry Screen

Delete

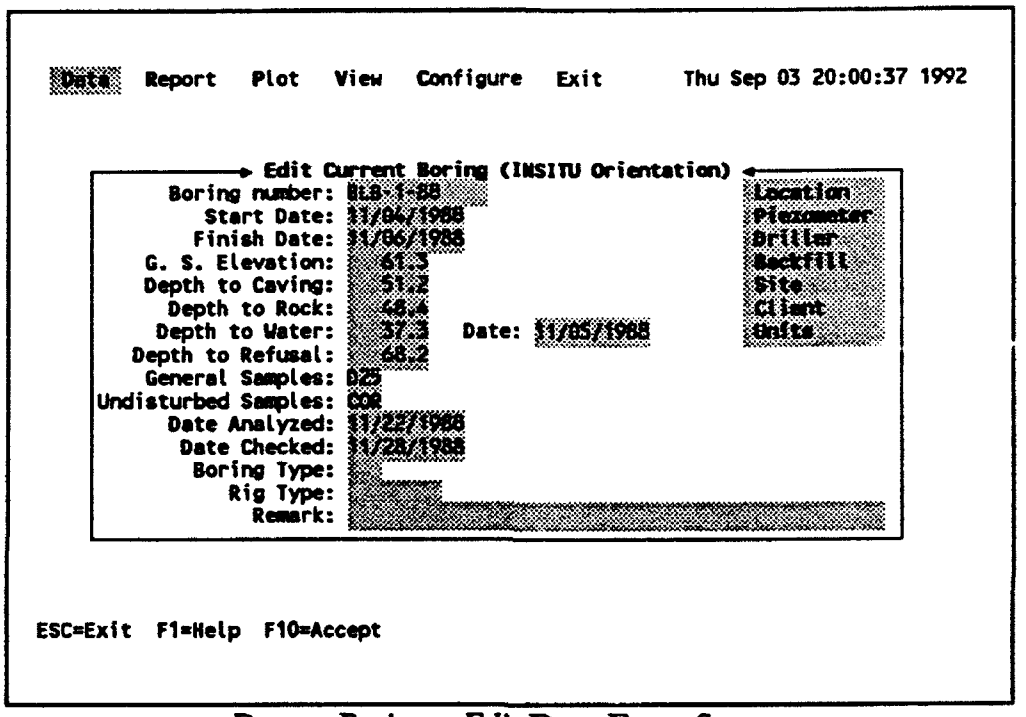
24. This command enables you to delete a project from the BLDM database. You specify the project using a project choice list in the same manner used when selecting the current project. Note that BLDM will also delete the project's data files, so this command should be used with care. As a safety measure, BLDM verifies that you truly want to delete a project before proceeding.

Boring

25. The *Data->Boring* sub-menu lets you select a boring, edit the currently selected boring, add new borings, and delete borings for the currently selected project. Note that all boring identifiers for a project must be unique.

Select

26. This sub-menu allows you to select a boring from a choice list of all borings defined for the current project. After you select a boring, BLDM will display its boring number in the status window and sub-menus which are only appropriate when a boring has been selected will be made available.



Data->Boring->Edit Data Entry Screen

Edit

27. This command allows you to edit the currently selected boring's data. Note that changes to the boring number will cause BLDM to update all of the boring's sample data, so insure that this what you intend.

Add

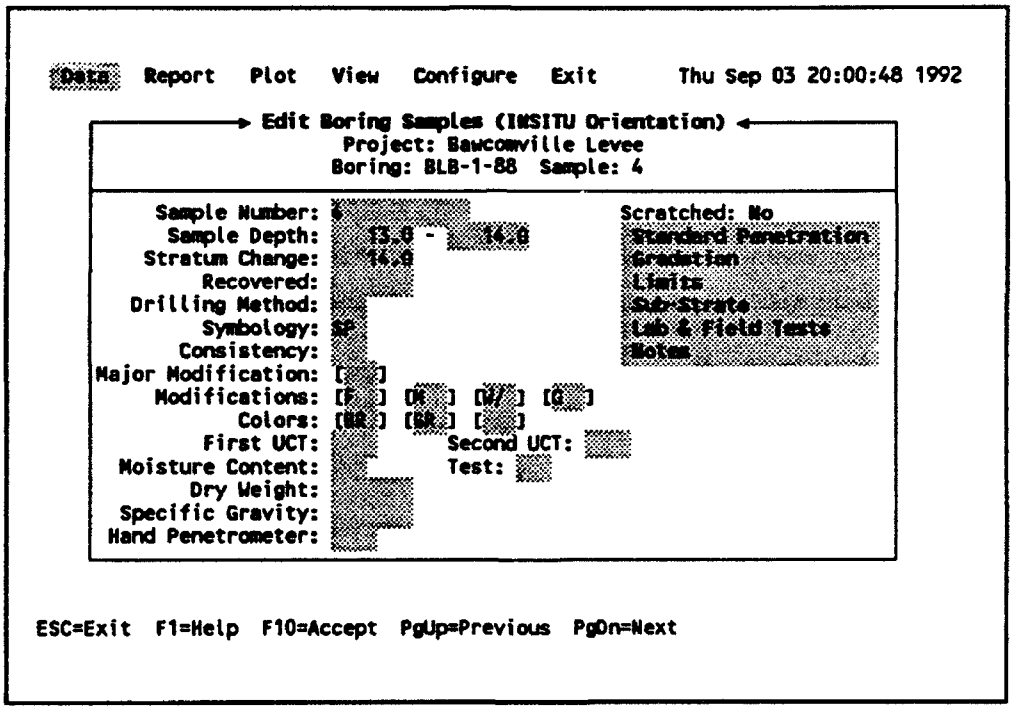
28. Use *Data->Boring->Add* to add new borings to the currently selected project. BLDM uses a form identical to the one used for editing the current boring for this purpose.

Delete

29. Use this item to delete a boring from the currently selected project. Note that BLDM will delete all of the boring's sample data when you delete a boring, so use this command with care. As a safety measure, BLDM will verify that you actually want to delete the boring before proceeding.

Sample

30. This sub-menu allows you to edit, add, or delete samples for the currently selected boring.



Data->Sample->Edit Data Entry Screen

Edit

31. BLDM locates all sample records for the currently selected boring and displays the first sample when you initially enter the form shown above. You may browse through the sample records with the **PgUp** and **PgDn** keys: **PgUp** will load the preceding sample record, **PgDn** the following. Pressing **F10** saves the current sample

record data to disk. BLDM will remain in the data entry form until you press the ESC key. Note that this is a virtual form and the sample's notes are available for modification below the remark field: use the **TAB** or cursor keys to move from the remark field into the following note fields.

Add

32. *Data->Sample->Add* allows you to enter new sample records for the current boring. BLDM uses a form identical to the one used for editing sample data. You must enter a sample number and the starting and ending sample depths, all other fields are optional. The symbology, consistency, color, and modification fields have attached choice lists of valid entries which you may access by pressing the **F2** key.

Delete

33. This command lets you delete sample records for the current boring using a choice list. BLDM deletes the indicated sample record and updates the sample index file.

Annulus

34. This command lets you edit piezometer annulus data for the current boring. BLDM brings up a full-screen data entry form which allows you to add, edit, or delete annulus records. Data items include: top and bottom depths, material type, and a text description. Note that you must first define the boring piezometer using the *Data->Boring->Add* or *Data->Boring->Edit* data entry screens before you can edit annulus data.

Core Recovery

35. This command lets you edit core recovery data for the current boring. BLDM brings up a full-screen data entry form which allows you to add, edit, or delete

core recovery records. Data items include: top and bottom depths, recovery length, and RQD recovery.

Core Box

36. This command lets you edit core box data for the current boring. BLDM brings up a full-screen data entry form which allows you to add, edit, or delete core box records. Data items include: top and bottom depths, core box number, and box size.

Backfill

37. This command lets you edit backfill data for the current boring. BLDM brings up a full-screen data entry form which allows you to add, edit, or delete backfill records. Data items include: top and bottom depths, material type, and a text description.

Water Level

38. This command lets you edit water level data for the current boring. BLDM brings up a full-screen data entry form which allows you to add, edit, or delete water level records. Data items include: water level depth, date, time, and the technician's name.

Geophysical Logs

39. This command lets you edit geophysical log data for the current boring. BLDM brings up a full-screen data entry form which allows you to add, edit, or delete geophysical log records. Data items include: top and bottom depths, date, material type, logger's name, and drilling contractor.

Cone Penetrometer

40. This command lets you edit cone penetrometer data for the current boring. BLDM brings up a full-screen data entry form which allows you to add, edit, or delete cone penetrometer records. Data items include: depth, cone type, penetration, end bearing, sleeve friction, and friction ratio.

Lab Reports

41. This command lets you edit laboratory report data for the current boring. BLDM brings up a full-screen data entry form which allows you to add, edit, or delete laboratory report records. Data items include: date, laboratory name, and report number.

PART III: REPORT MENU

42. BLDM provides five reports. The first three reports are basically tabulations of data contained in the project, boring, and sample data files. You may also print a legend of all user-modifiable symbols and definitions (i.e., soil and rock types, drilling methods, color symbol definitions, etc.). These reports are sent to the printer, which you specify with the *Configure->System->Printer* command. The *Report->INSITU* selection creates a user-specified ASCII text data file for use with the Intergraph INSITU program. If you need to print one of these INSITU data files, you must do so from the DOS prompt or with a word processor. Appendix E contains examples of all five reports.

Project

43. *Report->Project* creates a project summary report. BLDM displays a data form asking if you want to include all projects and whether or not to include boring information on the report. If you choose not to include all projects, BLDM prompts you with a choice list for the projects you do want on the report. If you elect to include boring information on the report, BLDM will also list each project's borings and the following boring data: ground surface elevation, depth to top of rock/tertiary, number of samples, and a tabulation of any special tests that have been performed on the boring's samples.

Boring

44. *Report->Boring* lists boring data for the currently selected project. BLDM first asks if you want all borings on the report. If you do not, BLDM allows you to select one or more borings from a choice list. The actual boring data listing is preceded by a header page consisting of the project data.

Sample

45. *Report->Sample* lists sample data for the currently selected project. BLDM first asks if you want all borings on the report. If you do not, BLDM allows you to select one or more borings from a choice list. The sample listing is preceded by a header page consisting of the project data.

INSITU

46. *Report->INSITU* creates an Intergraph INSITU data file for the currently selected project. BLDM displays a data entry form which you use to specify an output filename and whether or not you want to include all project borings. BLDM allows you to select all the project's borings with a simple 'yes' response on the data form. If you choose not to include all borings, BLDM lets you select one or more borings from a choice list before creating the data file. **NOTE:** The data file is created using the short keyword specification, so you must take care to use the short keywords when processing the file with Intergraph's INSITU product.

Legend

47. *Report->Legend* prints a legend of all defined BLDM symbols and definitions. These include: soil and rock types, drilling methods, sample colors, modification symbols, consistency symbols, and test types.

PART IV: PLOT MENU

Generate

48. The *Plot->Generate* command allows you to create plate data files used when creating boring log design files. These are ASCII text files whose format is described in Appendix B. BLDM uses a data entry form which allows you to specify the plate data filename and to invoke other data entry forms to completely specify the plate characteristics. The Borings, Options, Scaling, Layout, and Text fields invoke data entry forms which allow you to select borings, set options, modify the plate layout and scaling, and specify plate notes and title block text. You may invoke these fields as many times as necessary before actually creating the plate data file. This approach allows you to easily fine tune the scaling and plate layout. Once you are satisfied with the plate characteristics, press F10 to create the plate data file.

49. The Data filename field is where you choose a filename for the plate data. You specify this filename when creating boring log design files with the *Plot->Build* sub-menu. BLDM places the plate data files in the project directory. If the files already exist, BLDM will verify that you wish to overwrite them before continuing.

50. The Borings selection allows you to select the borings you want to place in the plate data file. BLDM will not create a plate data file unless you have selected at least one boring. When you have accepted your boring selections (by pressing F10), BLDM calculates the vertical axis range and the vertical and horizontal axis scales and places the borings equidistantly along the horizontal axis. You may change these values with the Scaling and Layout selections. **NOTE:** Selecting a new set of borings causes BLDM to overwrite any scaling and layout changes you have previously made with the Scaling and Layout selections.

51. The Options selection allows you to specify the ANSI plate size, various horizontal and vertical axis options, and whether or not to include modifications and written descriptions in the plate data file. BLDM automatically recalculates the axis scaling parameters if you change the plate size.

52. The Scaling selection allows you to modify both scale and range for the vertical and horizontal axes. BLDM automatically recalculates boring log horizontal axis placement if you change the horizontal axis scale or range. **NOTE:** It should never be necessary to change the vertical axis scale or range since BLDM automatically calculates 'best fit' values based on the selected borings.

53. The Layout selection allows you to modify the ground surface elevation and horizontal axis placement for all selected borings. The boring log ground surface elevations are taken directly from the boring data file and in most cases should not be changed. **NOTE:** You may wish to change the horizontal axis placement to more accurately indicate the borings' relative positions.

54. The Text selection allows you to specify the title block text and any notes you want to appear on the plate.

Build

55. The *Plot->Build* menu selection provides for the actual construction of boring log design files. The four sub-menus available under *Plot->Build* allow you to build design files containing 1, 2, or 3 rows of boring logs with each row containing as many as eleven logs, and to set options. BLDM creates these design files in the project directory.

56. Note that BLDM will automatically append the appropriate default plate data filename extension if you do not enter one as part of a data or design file specification. Default extensions are derived from the data and design file wildcard specifications you provide (see *Configure->System->Wildcards*). If you wish to specify a file that has no extension you must include the '.' in the filename (e.g., to specify a file named 'FOO', enter 'FOO.'), otherwise BLDM will append the default extension.

57. Before actually building the design file, BLDM analyzes the plate data file(s) and, if it finds logs which are too long to fit on the prescribed Y-axis, builds split-log data files. Split-log data files have the same name as the data file from which they are derived, but have .DSL extensions. BLDM replaces data file specifications with their corresponding split-log counterparts so that the resulting design file will contain split

logs.

1-row Boring Log

58. This selection allows you to build a design file containing a single row of logs. BLDM displays a data entry form where you enter the data and design files you want BLDM to use. Choice lists are available for both the data and design file fields if BLDM finds any data or design files in the project directory.

2-row Boring Log

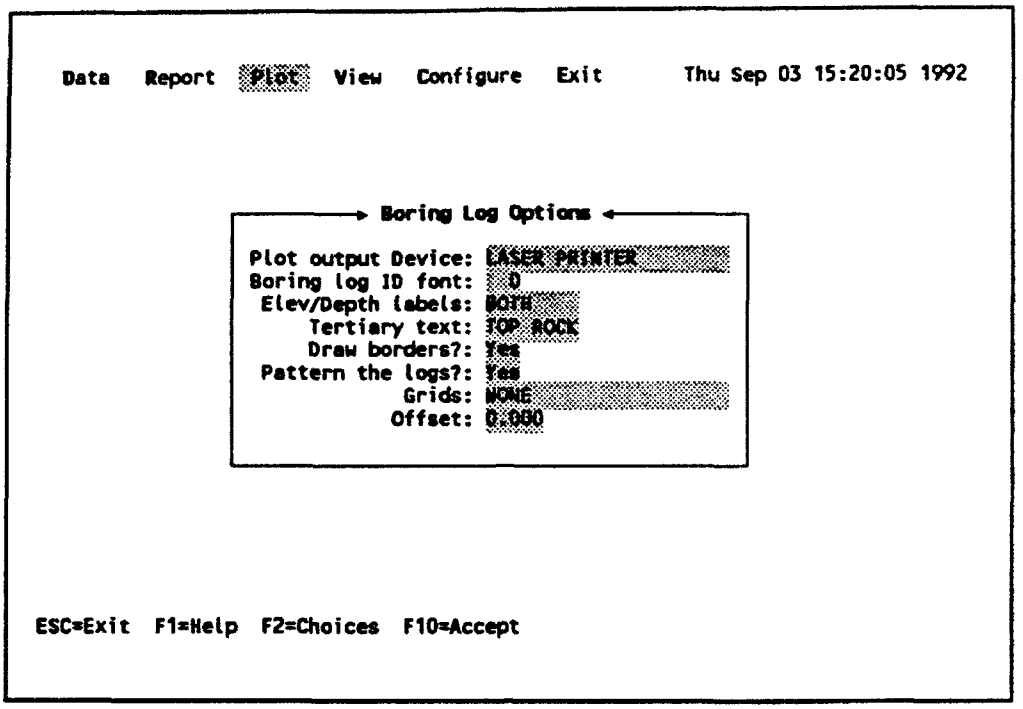
59. This selection allows you to build a design file containing two rows of logs. BLDM displays a data entry form where you enter the data and design files you want BLDM to use. Choice lists are available for both the data and design file fields if BLDM finds any data or design files in the project directory.

3-row Boring Log

60. This selection allows you to build a design file containing three rows of logs. BLDM displays a data entry form where you enter the data and design files you want BLDM to use. Choice lists are available for both the data and design file fields if BLDM finds any data or design files in the project directory.

Options

61. The *Plot->Build->Options* sub-menu invokes a data entry form (shown below) which allows you to set several runtime options.



Plot->Build->Options Data Entry Form

62. Plot Output Device. BLDM provides support for three device types: electrostatic plotters, pen plotters, and laser printers. BLDM does not send output directly to these devices; instead it associates line weight tables with each device. You may edit these line weight tables so that the design files created by BLDM will plot attractively when you generate hardcopy output. See *Configure->MicroStation->Device* for information about specifying device line weight tables. This is a protected field with a choice list, so you will need to press **F2** to change its value.

63. Boring Log ID Font. BLDM lets you specify the text font to use when placing boring log IDs.

64. Elevation/Depth Labels. You may choose to have BLDM label elevation/depth at the top of each log, the bottom of each log, or both. This is a protected field with a choice list, so you will need to press **F2** to change its value.

65. Tertiary Text. You may specify the 8-character label BLDM places at the 'tertiary' depth.

66. Borders and Title Block. If requested, BLDM will place borders and a title block in design files it creates. This accommodates those users who do not use reference files for this purpose.

67. Pattern. This option allows users to skip the most time-consuming step in building boring log design files - patterning the strata. This would be useful if you are only interested in verifying the layout or general appearance of a plate.

68. Grids. Indicate the type of grid you want placed in the design file. Choices include: no grid, horizontal grid only, or horizontal and vertical grids.

69. Offset. Enter the distance (in inches) you want the water table depth and tertiary depth shifted leftward. Set this value to zero to have these items placed in their normal positions.

Analyze

70. Use *Plot->Analyze* to verify the layout of a plate without actually building a design file. BLDM displays the results in a screen window and will also write them to the log file. See Appendix A for more information about the log and other BLDM options.

71. If the BLDM plate analysis routine finds logs which are too long to fit on the prescribed Y-axis, it will build a split-log data file. Split-log data files have the same filename as the data file from which they are derived, but have .DSL extensions. BP will replace the data file with its split-log counterpart so that when built, the resulting design file will contain split logs.

PART V: VIEW MENU

View File

72. This item lets you invoke an editor or file viewing utility. BLDM displays a data entry form where you specify the file you wish to view or edit. You may key in a filename or select a file from a choice list of available files by pressing the **F2** key. See *Configure->System->File Viewer* for more information about specifying the editor or file viewing program.

File Mask

73. This item allows you to specify a DOS filename specification (including the '*' and '?' wildcard characters) which BLDM uses to build a list of files available for viewing. You use may then use this choice list when selecting files to view with the *View->View File* command.

PART VI: CONFIGURE MENU

74. The *Configure* sub-menus let you tailor certain BLDM features that typically do not need to be changed very often. The *Configure* sub-menus include: *System*, *MicroStation*, and *Definitions*.

System

75. The *Configure->System* sub-menu lets you select a file-viewing program, a BLDM log filename, the name of your organization, wildcards for creating file choice lists, the type of printer connected to your system, and the data entry orientation.

File Viewer

76. *File Viewer* lets you specify the editor or file viewing program BLDM should use when you issue the *View->View File* command. The shareware program LIST.COM is a good choice for this purpose, but you may choose any program that will run in the available memory. If the program is not in the DOS PATH you will need to give a complete path specification, including drive and directory. You may also indicate any necessary command-line arguments.

Log Filename

This submenu allows you to specify the BLDM log file. The default log file is BLDM.LOG, but network users will each need to specify a unique filename so that network file access errors will not occur when multiple users are running BLDM.

User Name

77. *User Name* lets you modify the name of your organization. This is the name BLDM displays centered in the status window. It also appears on reports.

Wildcards

78. Whenever you select a project, BLDM builds choice lists of data and design files which exist in the project's directory. This command lets you specify the DOS wildcards used to build the choice lists. BLDM is distributed with these values set to '*.TXT' for data files and '*.DGN' for design files.

Printer

79. BLDM supports three types of printers for reports: Epson compatibles, Hewlett-Packard Laserjet compatibles, and ASCII text files. This item invokes a submenu which allows you to select the printer type and destination.

Type

80. This submenu lets you select the printer you wish to use. Pressing **F2** allows you to make the selection from a choice list of supported printers, which include Epson, Laserjet, or Text files.

Destination

81. This submenu lets you select the current printer's destination. Epson and Laserjet printer destinations must be one of the parallel or serial ports on your PC (i.e., LPT1, LPT2, LPT3, COM1, COM2, COM3, or COM4). These are available for selection from a choice list by pressing the **F2** key. If you have selected a serial port, be sure the port is properly configured before running BLDM. This usually requires a DOS

MODE command in your AUTOEXEC.BAT file to set the Baud rate and other serial parameters required by the printer. If you have selected a text file for the printer type, you must enter a DOS filename for the printer destination. BLDM will send printer output to this file when you print reports.

Orientation

82. This command lets you toggle the BLDM data entry orientation. BLDM provides two approaches to data entry: plate-orientated and INSITU-oriented. Both approaches simply modify the data fields available on the boring and sample data entry forms. The plate orientation is useful if you do not plan on using the BLDM INSITU data file features: it only displays the data fields used when creating design file plates and thus reduces the number of fields on the boring and sample forms, giving an uncluttered appearance to the forms. Selecting the INSITU orientation causes BLDM to display *all* data fields in order to fully support the INSITU data file standards.

83. Changing the data entry orientation does not delete any data - it only changes the data items made available for editing. If you decide later that you want to enter or edit INSITU-oriented data, you need only change the orientation to regain access to these items.

MicroStation

84. This sub-menu lets you configure BLDM's interaction with your MicroStation environment. You may specify the cell library file, plot output device type and characteristics, plate characteristics, seed design file, title block specifications, text sizes, and the version of MicroStation installed on your system.

Cell Library

85. This item lets you specify the cell library used by BLDM. BLDM is distributed with a modified copy of the geotechnical Corps-standard GEO.CEL cell

library (BLDMCELL.CEL) that should be adequate for most users. However, if you wish to use a different cell library, specify it here. Enter a complete DOS filename specification, including drive and directory.

Plot Output Device

86. BLDM places design file elements using line weight tables associated with three output devices: electrostatic plotters, pen plotters, and laser printers. Each line weight table has three values, one for placing the 'paper edge' trimline, one for placing lines, and one for placing text. This sub-menu lets you edit the line weight tables with a data entry form.

Plate

87. BLDM supports the following ANSI plate sizes: A, A (vertical), B, C, D, E, and F. This command lets you specify the top, bottom, left, and right margins and the title block height and width for each of the ANSI plate sizes. These values are in units of inches. BLDM is distributed with these values set to the values recommended by ANSI.

Seed File

88. This command lets you specify the seed design file used by BLDM to create design files. This seed file should conform to the applicable Corps standards. In particular, it should have working units of feet, inches, and 8000 positional units. Enter a complete DOS filename specification, including drive and directory.

Title Block

89. BLDM lets you specify the font, weight, text height, and text width for each of the six possible lines of title block text. This sub-menu invokes a data entry form

where you specify these values.

Text Sizes

90. This option lets you specify text sizes for twelve classes of text which BLDM places in design files. **Care should be taken when modifying the values distributed with BLDM: too large a variation from these values will yield undesirable results such as overwriting of text.**

MicroStation Version

91. This option lets you specify the version of MicroStation installed on your system. BLDM will call the appropriate design file building sub-programs depending on the MicroStation version you specify.

Definitions

92. This sub-menu lets you specify definitions for several items used when entering data, creating design file plates, and creating INSITU data files. These items include: soil and rock types, drilling methods, sample colors, modification symbols, consistency symbols, test types, and default units.

Soil and Rock Types

93. This command lets you configure the soil and rock types used to specify a sample's symbology. This is accomplished with a full-screen data entry form, where each row in the form contains an entry for a single soil or rock type. Fields include a code identifying the soil or rock type, a cell name, and a description. The name is used when entering sample data. BLDM uses the cell name for patterning strata when building boring plate design files. The name and description are used when creating data files for the Intergraph INSITU program. BLDM is distributed with the standard soil and rock types predefined. The soil and rock types defined here are available through a choice

list when entering or editing sample data.

Drilling Methods

94. This item lets you configure the drilling methods used to obtain borings. BLDM uses a full-screen data entry form, where each row in the form contains a code and a description for a single drilling method. The codes are used when entering or editing borings. BLDM uses both the code and description when creating data files for the Intergraph INSITU program. BLDM is distributed with the standard drilling methods predefined. The drilling methods defined here are available through a choice list when entering or editing boring data.

Colors

95. Use this command to specify color codes used when entering and editing sample data. BLDM displays a full-screen data entry form, with each row containing an upper-case color code, its mixed-case equivalent, and a description. You use the codes when entering or editing sample data. The mixed-case codes are used to create boring log design file plates. The mixed-case codes and descriptions are used when creating data files for the Intergraph INSITU program. BLDM is distributed with the standard color codes predefined. The colors defined here are available through a choice list when entering or editing sample data.

Modification Symbols

96. This command allows you to specify modification symbols used when entering and editing sample data. BLDM displays a full-screen data entry form, with each row containing an upper-case 3-character modification symbol, its 4-character mixed-case equivalent, and a description. The upper-case 3-character codes are used when entering or editing sample data. The descriptions are used when creating data files for the Intergraph INSITU program. The mixed-case codes are used to create boring log design

file plates. BLDM is distributed with the standard modification symbols predefined. The symbols defined here are available through a choice list when entering or editing sample data.

Consistency Symbols

97. This sub-menu allows you to specify consistency symbols used when entering and editing sample data. BLDM displays a full-screen data entry form, with each row containing an upper-case consistency symbol, its mixed-case equivalent, and a description. The upper-case symbols are used when entering or editing sample data. The descriptions are used when creating data files for the Intergraph INSITU program. The mixed-case codes are used to create boring log design file plates. BLDM is distributed with the standard consistency symbols predefined. The symbols defined here are available through a choice list when entering or editing sample data.

Test Types

98. This sub-menu allows you to specify test types used when entering and editing data. BLDM displays a full-screen data entry form, with each row containing a 3-character test name, an optional cell name (for use when building design file plates), a 1-character test code (for use when creating plate data files), the test type (field or lab), and a text description. The 3-character test names are used when entering or editing data - they are what BLDM stores in the data files. The 1-character test codes are used in plate data files to indicate which cells should be used in boring log design file plates. The descriptions are used when creating data files for the Intergraph INSITU program. The test types defined here are available through a choice list when entering or editing sample data.

Default Units

99. This sub-menu allows you to specify default units for the following items:

boring depths, sample depths, core recovery depths, permeability, unconfined compression tests, Brazilian tensile tests, standard penetrometer tests, and cone penetrometer tests. These units are used when creating INSITU data files and are available using a choice list when entering data.

PART VII: BLDM QUICK REFERENCE

Data

Project	Project data management functions
Select	Select current project
Edit	Edit current project
Add	Add new projects
Delete	Delete projects
Boring	Boring data management functions
Select	Select current boring
Edit	Edit current boring
Add	Add new borings
Delete	Delete borings
Sample	Sample data management functions
Edit	Edit samples
Add	Add new samples
Delete	Delete samples
Annulus	Edit piezometer annulus data
Core recovery	Edit core recovery data
core boX	Edit core box data
backFill	Edit backfill data
Water level	Edit water level data
Geophysical logs	Edit geophysical log data
coNe penetrometer	Edit cone penetrometer data
lab Reports	Edit laboratory report data

Report

Project	Print project report
Boring	Print boring report for current project
Sample	Print sample report for current boring
INSITU	Create INSITU data file for current project
Legend	Print legend of defined symbols

Plot

Generate	Generate plate data files
Build	Create boring log design files
1-row Boring Log	Create 1-row boring log design file
2-row Boring Log	Create 2-row boring log design file
3-row Boring Log	Create 3-row boring log design file
Options	Specify plate and design file options
Analyze	Analyze plate layout

View

View file	View a file
File mask	Specify file selection mask

Configure

System	System configuration
File viewer	Specify file viewing program
Log filename	Specify log file
User name	Specify organization name
Wildcards	Specify wildcards for plate data and design files
pRinter	Specify printer type and destination
Type	Specify printer type
Destination	Specify printer destination
Orientation	Specify data entry orientation
MicroStation	Microstation configuration
cell liBrary	Specify cell library
plot output Device	Specify device line weight tables

Plate	Specify margins and title block size for ANSI plates
sEed file	Specify seed design file
Title block	Specify font, weight, and text size for each line of title block text
text siZes	Specify text sizes for design files
Microstation version	Specify font, weight, and text size for each line of title block text
Definitions	Edit system definitions
Soil and rock types	Specify wildcards for plate data and design files
Drilling methods	Specify drilling methods
Colors	Specify color definitions
Modification symbols	Specify modification symbols
cOnsistency symbols	Specify consistency symbols
Test types	Specify test types
Default units	Specify default units
Exit	Exit BLDM program and return to DOS

APPENDIX A: INSTALLING BLDM

System Requirements

1. BLDM requires 447 kB or more of free RAM to run: the amount will vary depending on the actual number of projects, borings, and boring data. If your system has EMS memory available, BLDM will use 32 kB for static data, reducing the minimum amount of free conventional RAM needed to 415 kB. The optimum amount of free EMS memory for use with BLDM is 288 kB - if this much EMS memory is available, BLDM will use the EMS memory to allocate the 32 kB static data block and buffer its overlay sections as well. If you plan on using BLDM to generate boring log design files, this is the minimum amount of RAM which must be available *after* loading the MicroStation resident scanner and your PC must also be equipped with a math coprocessor. In addition, there must be enough hard disk space to accommodate the BLDM system files (approximately 1 MB), the boring database files, and the design files created using BLDM. It is highly recommended that users maximize the amount of available conventional DOS memory by using memory management software to load device drivers, network drivers, and other memory-resident software into the upper and high memory areas.

2. BLDM automatically detects the current DOS video mode and functions accordingly. Users with EGA or VGA video adapters may use enhanced video modes, including the 43-line and 50-line modes, when running BLDM. Users with monochrome displays driven by color adapters (i.e., 16 shades of gray) may wish to set their DOS video mode to black and white when using BLDM: this makes the screens easier to read. BLDM includes a command-line option for forcing the video mode to black and white at runtime.

Installing the BLDM System Files

3. To install the BLDM system, insert the distribution diskette in a floppy drive, make that floppy drive the default drive, and enter BLDMNSTL at the DOS prompt.

APPENDIX A: INSTALLING BLDM

The installation program prompts you for the information it needs to install BLDM on your PC. You may press the **F1** key to obtain context-sensitive help about the installation process. Explicit instructions for installing the system from drive A: follow:

1) Insert distribution disk in drive A:

2) Make drive A: the default drive:

A: (enter)

3) Run the installation program:

BLDMNSTL (enter)

The BLDM distribution disk contains three files:

BLDMNSTL.EXE	BLDM installation program
BLDMNSTL.HLP	Help file for the BLDM installation program
BLDMSYS.EXE	BLDM program files, cell library, and seed design file

Directory Considerations

4. BLDMNSTL.EXE installs the BLDM system files in a user-specified directory. This directory *should* lie in the DOS PATH, but need not if the user will always work with BLDM in a single directory.

Using BLDM on a Local Area Network

5. BLDM was designed for use on Local Area Networks (LANs). It performs the necessary file and record locking functions so that multiple users may work on the same or different projects simultaneously. The BLDM system files must be in a public directory and BLDM users must have read and write privileges to this directory. Network administrators should set file access attributes to read only, shared, and execute for all BLDM executables so that they will not accidently be deleted. In addition, BLDM users must have read and write access to all BLDM project directories.

6. Each BLDM user on a LAN (Local Area Network) must have a unique initialization file. This file must be specified with the 'I' option when BLDM is executed

(See the 'BLDM Command Line Options' section below). User initialization files may be obtained by copying the BLDM.INI file created when BLDM is installed. After obtaining an initialization file, each user should specify a unique log filename with the *Configure->System->Log Filename* command. If BLDM is available from a menu system, Network administrators may wish to use environment variables defined in user login scripts to specify the proper initialization file when BLDM is invoked.

DOS File Handles

7. Make sure your PC's CONFIG.SYS file specifies that DOS should provide at least 20 file handles. CONFIG.SYS should contain a line that looks like this:

FILES=20.

8. If FILES is set to a higher value, you do not need to modify CONFIG.SYS.

Running BLDM

9. To execute BLDM, simply enter **BLDM** at the DOS prompt. If you have installed BLDM in a directory that is not in the DOS PATH you will need to change to that directory before running the program. Alternatively, you may wish to modify a copy of the USTATION.BAT batch file and replace the MicroStation call with a call to BLDM.

BLDM Command Line Options

10. BLDM has seven user command-line options. Command-line options are specified on the DOS command line when you run the BLDM program. These options include:

-b: Run BLDM in black and white mode. Some users may use a monochrome monitor with a color graphics adapter (i.e., colors are represented by various

shades of gray). The BLDM screens will be much more attractive and easier to read if you tell BLDM to run in black and white mode. If you want BLDM to run in black and white mode without using the -b option, use the DOS MODE command to set the default video mode to black and white (i.e., enter "MODE BW80" at the DOS prompt).

-d: This option provides detailed run-time debugging information in case you are experiencing problems with the BLDM program. It causes BLDM to write detailed run-time information to the BLDM log file (an ASCII text specified using the *Configure->System* sub-menu), and the design file building routines will pause for a user keystroke before continuing. You will normally not want to use this option as it slows the program down somewhat.

-e: Disable use of EMS memory. Use this option if you do not want BLDM to use EMS memory.

-h: BLDM will display a help screen describing its command-line options and exit when invoked with this option.

-i: This option allows users to specify the BLDM initialization file. You must enter an initialization filename on the command line following this option. This option is required when BLDM is used by multiple users on a Local Area Network (LAN).

-l: This option is similar to the -d (debug) option. It causes BLDM to write log information to the log file, but does not write as much information, and the design file building programs will not pause and wait for a user keystroke before continuing.

-r: Restore last working project. Use this option if you want BLDM to automatically load the project you were working on the last time you ran BLDM.

Examples:

1) Suppose you have a monochrome monitor with a color graphics card and want to run BLDM in Black & White mode. Execute BLDM with the following command: BLDM -b.

2) To obtain debugging information in the log, execute BLDM with the following command: BLDM -d.

3) To run BLDM on a LAN with initialization file MYBLDM.INI, execute the program thus: BLDM -i MYBLDM.INI

APPENDIX B: DATA FILE LAYOUT

Database Files

1. BLDM uses six system data files in xBase format. These files have .DAT extensions and must be located in the same directory as the BLDM executables. The files include:

BLDMPROJ.DAT	Projects
BLDMDRLM.DAT	Drilling methods
BLDMSLRK.DAT	Soil and rock types
BLDMCOLR.DAT	Color definitions
BLDMMODS.DAT	Modification symbols
BLDMCONS.DAT	Consistency symbols
BLDMTEST.DAT	Test definitions

2. Project boring and sample files are named when creating a project and are located in the project directory specified by the user.

3. BLDM stores all numeric data in character fields to allow for 'blank' (i.e., null) values. The number of decimal places indicated in the following tables is enforced when data are entered via BLDM data entry screens.

APPENDIX B: DATA FILE LAYOUT

BLDMPROJ.DAT - Project Data File

Field	Type	Width	Decimals	Description
PROJ_NAME	C	40		Project name
PROJ_NUM	C	12		Project number
PROJ_DIR	C	129		Project directory
PROJ_FILE	C	7		Data filename root
CLNT_NAME	C	40		Client name
CLNT_NUM	C	12		Client number
SITE_NAME	C	40		Site name
SITE_NUM	C	12		Site number
DRILL_CTR	C	40		Drilling contractor
LAT_DEG	C	2		Latitude - Degrees
LAT_MIN	C	2		Latitude - Minutes
LAT_SEC	C	5	2	Latitude - Seconds (decimal)
LONG_DEG	C	3		Longitude - Degrees
LONG_MIN	C	3		Longitude - Minutes
LONG_SEC	C	5	2	Longitude - Seconds
NORTHING	C	11	2	Location (North/South)
EASTING	C	11	2	Location (East/West)

BLDMDRLM.DAT - Drilling Methods

Field	Type	Width	Decimals	Description
METHOD	C	3		Drilling method/tool
DIAM	C	4		Drilling tool diameter
U_DIAM	C	2		Diameter units
DESCRIP	C	20		Description

APPENDIX B: DATA FILE LAYOUT

BLDMSLRK.DAT - Soil and Rock Types

Field	Type	Width	Decimals	Description
NAME	C	3		Material
CELLNAME	C	6		Cell Name
DESCRIP	C	40		Material description

BLDMCOLR.DAT - Color Definitions

Field	Type	Width	Decimals	Description
NAME	C	3		Uppercase Code
MIXEDCASE	C	4		Mixed-case Code
DESCRIP	C	20		Description

BLDMMODS.DAT - Modification Symbols

Field	Type	Width	Decimals	Description
NAME	C	3		Uppercase Code
MIXEDCASE	C	4		Mixed-case Code
DESCRIP	C	40		Description

BLDMCONS.DAT - Consistency Definitions

Field	Type	Width	Decimals	Description
NAME	C	3		Uppercase Code
MIXEDCASE	C	3		Mixed-case Code
DESCRIP	C	10		Description

APPENDIX B: DATA FILE LAYOUT

BLDMTEST.DAT - Test Definitions

Field	Type	Width	Decimals	Description
NAME	C	3		Uppercase Code
CELLNAME	C	6		Cell for use in design files
CODE	C	1		Single-character code
TYPE	C	1		Test type: L=Lab, F=Field
DESCRIP	C	20		Description

Project Boring Data

Field	Type	Width	Decimals	Description
BOR_NUM	C	12		Boring number
BOR_TYPE	C	20		Boring type
RIG_TYPE	C	20		Rig type
CLNT_NAME	C	40		Client name
CLNT_NUM	C	12		Client number
SITE_NAME	C	40		Site name
SITE_NUM	C	12		Site number
DRILL_CTR	C	40		Drilling contractor
DRL_FNM	C	8		Driller's first name
DRL_MNM	C	1		Driller's middle initial
DRL_LNM	C	16		Driller's last name
LGR_FNM	C	8		Logger's first name
LGR_MNM	C	1		Logger's middle initial
LGR_LNM	C	16		Logger's last name
BF_CTR	C	40		Backfill contractor
BF_CC_FNM	C	8		Backfill foreman's first name
BF_CC_MNM	C	1		Backfill foreman's initial
BF_CC_LNM	C	16		Backfill foreman's last name

APPENDIX B: DATA FILE LAYOUT

Field	Type	Width	Decimals	Description
FBOOK_NO	C	15		Field book number
LOCN_1	C	32		Location (1)
LOCN_2	C	22		Location (2)
NORTHING	C	11	2	North/South location
EASTING	C	11	2	East/West location
STATION	C	11	2	Station
OFFSET	C	11	2	Offset
AZIMUTH	C	11	4	Azimuth
ANGLE	C	11	4	Angle
ALIGNMENT	C	64		Alternate alignment name
ALT1	C	11	2	Alternate coordinate #1
ALT2	C	11	2	Alternate coordinate #2
GS_ELEV	C	7	1	Ground surface elevation
DP_CAVING	C	7	1	Depth to caving
DP_ROCK	C	7	1	Depth to rock/tertiary
DP_WTBL	C	7	1	Depth to water table
DP_REFUSAL	C	7	1	Depth to refusal
METH_DRILL	C	3		Drilling method
GEN_SAMPLE	C	3		Sample drilling method
UND_SAMPLE	C	3		Undisturbed sample drilling method
BOR_REMARK	C	40		Boring remark
BF_REMARK	C	40		Backfill remark
U_BORING	C	8		Boring units
U_STDPENE	C	8		Std. penetrometer units
U_CONEPENE	C	8		Cone penetrometer units
U_PIEZO	C	8		Piezometer units

APPENDIX B: DATA FILE LAYOUT

Field	Type	Width	Decimals	Description
U_CORE	C	8		Core recovery units
U_PERM	C	8		Permeability units
U_UCT	C	8		Unconfined comp. test units
U_BRAZIL	C	8		Brazilian tensile test units
U_SAMPLE	C	8		Sample units
DATE_START	D	8		Installation start date
DATE_STOP	D	8		Installation completion date
DATE_BF	D	8		Backfill installation date
DATE_WTBL	D	8		Water table date
DATE_ANAL	D	8		Date analyzed
DATE_CHECK	D	8		Date checked

APPENDIX B: DATA FILE LAYOUT

Boring Sample Data

Field	Type	Width	Decimals	Description
BOR_NUM	C	12		Boring number
SAMPLE_NUM	C	12		Sample number
DTOP	C	7	1	Depth at top of sample
DBOTTOM	C	7	1	Depth at bottom of sample
STRAT_CHNG	C	7	1	Depth at stratum change
RECOVERED	C	7	1	Length recovered
MATERIAL	C	3		Soil/Rock material type
MOIST_CONT	C	2		Sample moisture content (%)
MOIST_TEST	C	2		Tested moisture content (%)
DRY_WGT	C	7	2	Dry weight
SPEC_GRAV	C	7	2	Specific gravity
ATLIM_LL	C	3		Atterberg liquid limit
ATLIM_PL	C	3		Atterberg plastic limit
SHRINK_L	C	3		Shrinkage limit
LINEAR_L	C	3		Linear limit
GRAVEL	C	7	2	Gravel content
SAND	C	7	2	Sand content
FINES	C	7	2	Fines content
CLAY	C	7	2	Clay content
D10	C	7	4	D10 content
D25	C	7	4	D25 content
D50	C	7	4	D50 content
D60	C	7	4	D60 content
D75	C	7	4	D75 content

APPENDIX B: DATA FILE LAYOUT

Field	Type	Width	Decimals	Description
HAND_PENE	C	7	2	Hand penetrometer reading
VANE_SHEAR	C	7	2	Vane shear reading
VANE_TYPE	C	3		Vane shear type
STD_PENE	C	4		Std. penetration value
BLOW_1	C	2		Blow count #1
BLOW_2	C	2		Blow count #2
BLOW_3	C	2		Blow count #3
BLOW_4	C	2		Blow count #4
BLOW_5	C	2		Blow count #5
PENE_1	C	5	2	Penetration #1
PENE_2	C	5	2	Penetration #2
PENE_3	C	5	2	Penetration #3
PENE_4	C	5	2	Penetration #4
PENE_5	C	5	2	Penetration #5
PERM_TYPE	C	3		Permeability test type
PERM_COEF	C	7	1	Coefficient of permeability
UCT_1	C	4		Unconfined compr. test #1
UCT_2	C	4		Unconfined compr. test #2
BRAZIL	C	7	1	Brazilian tensile test
MAJOR_MOD	C	3		Major modification
CONSIS	C	3		Consistency
COLOR1	C	3		Color #1
COLOR2	C	3		Color #2
COLOR3	C	3		Color #3
MSYM1	C	3		Modification symbol #1
MSYM2	C	3		Modification symbol #2

Field	Type	Width	Decimals	Description
MSYM3	C	3		Modification symbol #3
MSYM4	C	3		Modification symbol #4
METH_DRILL	C	3		Drilling method
REMARK	C	40		Remark
NOTE1	C	27		Note #1
NOTE2	C	27		Note #2
NOTE3	C	27		Note #3
NOTE4	C	27		Note #4
NOTE5	C	27		Note #5
SCRATCH	L	1		Scratched sample flag

Boring Piezometer Well Data

Field	Type	Width	Decimals	Description
BOR_NUM	C	12		Boring number
WELL_NUM	C	12		Well number
WELL_TYPE	C	20		Well type
TEST_METH	C	3		Test method
SURF_PROT	C	20		Surface protection
INST_CTR	C	40		Installation contractor
CC_FNM	C	8		Foreman's first name
CC_MNM	C	1		Foreman's middle initial
CC_LNM	C	16		Foreman's last name
LGR_FNM	C	8		Logger's first name
LGR_MNM	C	1		Logger's middle initial
LGR_LNM	C	16		Logger's last name
CASING	C	8		Casing type
CASE_DIAM	C	7	2	Casing diameter

Field	Type	Width	Decimals	Description
CASE_HGHT	C	7	2	Casing height
EFF_OPSIZE	C	7	2	Effective opening size
SCREEN	C	20		Screen type
DTOP	C	7	1	Screen top depth
DBOTTOM	C	7	1	Screen bottom depth
DP_TRAP	C	7	1	Depth to bottom of trap
REMARK	C	40		Remark
DATE_START	D	8		Installation start date
DATE_STOP	D	8		Installation completion date

Piezometer Annulus Data

Field	Type	Width	Decimals	Description
BOR_NUM	C	12		Boring number
WELL_NUM	C	12		Well number
DTOP	C	7	1	Depth at top of sample
DBOTTOM	C	7	1	Depth at bottom of sample
TYPE	C	3		Soil/Rock material type
DESCRIP	C	40		Description

Core Recovery Data

Field	Type	Width	Decimals	Description
BOR_NUM	C	12		Boring number
DTOP	C	7	1	Depth at top of sample
DBOTTOM	C	7	1	Depth at bottom of sample
RECOVERY	C	7	1	Recovery length
RQD	C	7	1	RQD recovery

APPENDIX B: DATA FILE LAYOUT

Core Box Data

Field	Type	Width	Decimals	Description
BOR_NUM	C	12		Boring number
BOX_NUM	C	12		Box number
DTOP	C	7	1	Depth at top of sample
DBOTTOM	C	7	1	Depth at bottom of sample
BOXSIZE	C	8		Box size

Backfill Data

Field	Type	Width	Decimals	Description
BOR_NUM	C	12		Boring number
DTOP	C	7	1	Depth at top of sample
DBOTTOM	C	7	1	Depth at bottom of sample
TYPE	C	3		Soil/Rock material type
DESCRIP	C	40		Description

Water Level Data

Field	Type	Width	Decimals	Description
BOR_NUM	C	12		Boring number
DATE_WTR	D	8		Date of reading
TIME_WTR	C	5		Time of reading
DP_WTR	C	7	1	Depth to water
TECH_FNM	C	8		Technician's first name
TECH_MNM	C	1		Technician's middle initial
TECH_LNM	C	16		Technician's last name

APPENDIX B: DATA FILE LAYOUT

Geophysical Log Data

Field	Type	Width	Decimals	Description
BOR_NUM	C	12		Boring number
DATE_LOG	D	8		Sample date
DTOP	C	7	1	Depth at top of sample
DBOTTOM	C	7	1	Depth at bottom of sample
TYPE	C	3		Soil/Rock material type
LGR_FNM	C	8		Logger's first name
LGR_MNM	C	1		Logger's middle initial
LGR_LNM	C	16		Logger's last name
DRILL_CTR	C	40		Contractor

Cone Penetrometer Data

Field	Type	Width	Decimals	Description
BOR_NUM	C	12		Boring number
DEPTH_CONE	C	7	1	Cone depth
TYPE	C	3		Cone type
CONE_PENE	C	4		Cone penetration
BEARING	C	7	2	End bearing
SLEEVE	C	7	2	Sleeve friction
RATIO	C	7	2	Friction ratio

Laboratory Report Data

Field	Type	Width	Decimals	Description
BOR_NUM	C	12		Boring number
LAB_NAME	C	40		Laboratory number
DATE_RPT	D	8		Report date
REPORT_NUM	C	64		Report number

APPENDIX B: DATA FILE LAYOUT

Sample Test Data

Field	Type	Width	Decimals	Description
BOR_NUM	C	12		Boring number
SAMPLE_NUM	C	12		Sample number
TYPE	C	3		Test type
LGR_FNM	C	8		Logger's first name
LGR_MNM	C	1		Logger's middle initial
LGR_LNM	C	16		Logger's last name

Sample Substrata Data

Field	Type	Width	Decimals	Description
BOR_NUM	C	12		Boring number
SAMPLE_NUM	C	12		Sample number
DTOP	C	7	1	Depth at top of stratum
DBOTTOM	C	7	1	Depth at bottom of stratum
MATERIAL	C	3		Soil/Rock material type

Plate Design File Data Files

4. Plate design file data files are used by BLDM when creating boring log design files. Plate design file data files are formatted as follows: Each data file begins with a file header block consisting of 9 to 12 records, the number of file header block records depending on the number of plate notes included in the data file. Boring log data blocks follow the file header block. There may be as many as eleven (11) boring log data blocks in a data file. Each boring log data block consists of 6 boring log header records followed by an arbitrary number of boring log data records. Boring log data records contain either sample data or written descriptions. The tables which follow describe each record type:

APPENDIX B: DATA FILE LAYOUT

File Header Block - Record 1

Field	Width	Range	Format	Description
1	5	0 1	Integer	No vertical staffs Include vertical staffs
2	5	1 2	Integer	Vertical staffs to left and right of plate Vertical staffs to left of each log
3	5	1 2	Integer	Label vertical staffs with "DEPTH IN FEET" Label vertical staffs with "ELEVATION IN FEET N.G.V.D."
4	5	0 1	Integer	No horizontal staffs Include horizontal staffs
5	5	1 2	Integer	Label horizontal staffs with "DISTANCE IN FEET" Label horizontal staffs with stationing
6	5	0 1	Integer	No written descriptions Include written descriptions
7	5	0 1	Integer	No sample test cells Include sample test cells
8	5	0 1	Integer	No modifications Include modifications
9	5	AV A B C (-1) D (1) E (-2) F	Text	Plate size = ANSI A (vertical, 11 x 8.5)[1] Plate size = ANSI A (horizontal, 8.5 x 11) Plate size = ANSI B (11 x 17) Plate size = ANSI C (17 x 22) Plate size = ANSI D (22 x 34) Plate size = ANSI E (34 x 44) Plate size = ANSI F (28 x 40)
10	5	0-4	Integer	Number of plate notes (0 through 4 allowed)

[1] Dimensions in inches, width (vertical) by length (horizontal), per ANSI Y14.1-1980

APPENDIX B: DATA FILE LAYOUT

File Header Block - Record 2

Field	Width	Range	Format	Description
1	10	*	Real	Starting horizontal staff distance in feet
2	10	*	Real	Ending horizontal staff distance in feet
3	5	*	Real	Lower vertical staff elevation in feet
4	5	*	Real	Upper vertical staff elevation in feet
5	5	*	Real	Horizontal (X-axis) scale in feet per inch
6	5	*	Real	Vertical (Y-xis) scale in feet per inch
7	5	1-11	Integer	Number of boring logs in data file

File Header Block - Records 3-8

Field	Width	Range	Format	Description
1	45	*	Text	Title block text

File Header Block - Records 9-12 (Optional)

Field	Width	Range	Format	Description
1	45	*	Text	Drawing notes

APPENDIX B: DATA FILE LAYOUT

Boring Log Header Records

Record	Field	Width	Format	Description
1	1	10	Real	Distance from X-axis origin in feet
	2	10	Real	Ground surface elevation
	3	10	Real	Split-log elevation (used only by BLDM in split-log data files)
2	1	15	Text	Boring log ID
	2	10	Real	Tertiary depth in feet
3	1	32	Text	Location information (Line 1)
4	1	22	Text	Location information (Line 2)
5	1	15	Text	Field book number
6	1	10	Date	Sample date (DD MMM YY)
	2	10	Date	Water table sample date (MM/DD/YY)
	3	10	Real	Water table depth in feet

APPENDIX B: DATA FILE LAYOUT

Boring Log Data Record

Field	Width	Format	Description
1	7	Real	Upper depth of sample in feet
2	7	Real	Lower depth of sample in feet
3	7	Real	Stratum change in feet
4	6	Text	Cell name of material
5	15	Text	Sample color
6	4	Text	Major modification
7	25	Text	Modifications (including consistency)
8	5	Text	Tests performed
9	2	Real	Water content (sample)
10	2	Real	Water content (test)
11	4	Real	Unconfined compression test #1
12	4	Real	Unconfined compression test #2
13	3	Real	Atterberg liquid limit
14	3	Real	Atterberg plastic limit
15	4	Real	Penetration resistance
16	7	Real	D_{10} size
17	1	Integer	Number of sample notes (immediately succeed record)

Boring Log Data Record - Sample Note

Field	Width	Format	Description
1	27	Text	Sample note

Boring Log Data Record - End-of-boring

Field	Width	Format	Description
1	5	Real	'999.9' indicates end of boring log data block

APPENDIX C: DESIGN FILE ELEMENT LEVELS

Levels Used By BLDM

Level	Elements
1	Boring log shapes
2	Modification symbols
3	Sample notes
4	Colors and associated lines
5	Plastic limit, liquid limit, D_{10} size, water content
6	Boring log ID, station, location, field book number, sample date
7	Elevations above and below log and associated lines
8	Water table cell and observed date, Tertiary text and associated dashed line
9	Unconfined compression tests, penetration resistance
10	Plate notes
60	Vertical and horizontal staffs
61	Grids
62	Border, title block, title block text
63	Paper-edge and title block trim lines

APPENDIX D: CELL LIBRARY

The BLDMCELL.CEL library provided with BLDM is a modified copy of the Corps-standard GEO.CEL cell library. The only modifications to GEO.CEL were the inclusion of two additional cells. One, named 'ARROW', was simply copied from the CORPS.CEL general-purpose cell library. The other, named 'WTRTBL', is used to indicate the water table depth. Five cells are used to identify the tests stored in field 13 of the boring log data record. Most cells used by BLDM are utilized for patterning strata: a table of these cells appears on the next page.

Miscellaneous Cells

Cell	Use
4TSTS	Four test ('T') indicator
ARROW	Line terminator
CDDSHR	'S' test indicator
CTST	'C' test indicator
CUTRX	'R' test indicator
UUTRX	'Q' test indicator
WTRTBL	Water table depth indicator

APPENDIX D: CELL LIBRARY

The table below shows the strata names and associated cells used for patterning. The strata names correspond to field 7 of a boring log data record.

Cells Used For Patterning Strata

Stratum	Cell	Material Name	Pattern
AGG	BREC	BRECCIA	
AND	ANDE	ANDESITE	
BAS	BASA	BASALT	
CEM	CEMSHA	CEMENTED SHALE	
CH	CH	USCS SOIL SYMBOL for CLAY	
CHA	CHAL	CHALK or MARL	
CL	CL	USCS SOIL SYMBOL for CLAY	
CLA	CLAY	CLAYSTONE or SILTSTONE	
COA	COAL	COAL	
CON	CONG	CONGLOMERATE	
DIO	DIOR	DIORITE	
DOL	DOLO	DOLOMITE	
GAB	GABB	GABBRO	
GC	GC	USCS SOIL SYMBOL for GRAVELS	
GM	GM	USCS SOIL SYMBOL for GRAVELS	
GNE	GNEI	GNEISS	
GP	GP	USCS SOIL SYMBOL for GRAVELS	
GRA	GRAY	GRAYWACKE	
GRN	GRAN	GRANITE	
GW	GW	USCS SOIL SYMBOL for GRAVELS	

APPENDIX D: CELL LIBRARY

Cells Used For Patterning Strata

Stratum	Cell	Material Name	Pattern
LIM	LIME	LIMESTONE	
MAR	MARB	MARBLE	
MH	MH	USCS SOIL SYMBOL for SILTS and CLAYS	
ML	ML	USCS SOIL SYMBOL for SILTS and CLAYS	
OH	OH	USCS SOIL SYMBOL for SILTS and CLAYS	
OL	OL	USCS SOIL SYMBOL for SILTS and CLAYS	
PT	PT	USCS SOIL SYMBOL for PEAT or HIGHLY ORGANIC SOILS	
QUA	QUAR	QUARTZITE	
RHY	RHYO	RHYOLITE	
SAN	SAND	SANDSTONE	
SC	SC	USCS SOIL SYMBOL for SAND	
SCH	SCHI	SCHIST	
SHA	COMSHA	COMPACTED SHALE	
SLA	SLAT	SLATE	
SM	SM	USCS SOIL SYMBOL for SAND	
SOA	SOAP	SOAPSTONE or SERPENTINE	
SP	SP	USCS SOIL SYMBOL for SAND	
SW	SW	USCS SOIL SYMBOL for SAND	
TUF	TUFF	TUFF or TUFF BRECCIA	
WD	WOOD	WOOD	

APPENDIX E: EXAMPLE REPORTS

Project Report

Project Listing Page 1

St. Louis District, Corp of Engineers
Report created on Thursday, 03 September 1992 at 04:13PM

Project: Bawcomville Levee P2-1-234
Borings: 4
Client: Bacomville Municipality C-1-234-N
Site: Bawcomville Municipality and environs S-1-234-E
Contractor:
Latitude:
Longitude:
Northing: 1.23
Easting: 2.34
Directory: D:\WES\BLDM2\BAWCOM\
Data Files: Borings[BAWCOMB.DBF] Samples[BAWCOMS.DBF]

Project: Sicily Island 5B RRWW
Borings: 5
Client:
Site:
Contractor:
Latitude:
Longitude:
Northing:
Easting:
Directory: D:\WES\BLDM2\ISLAND5\
Data Files: Borings[ISLAND5B.DBF] Samples[ISLAND5S.DBF]

APPENDIX E: EXAMPLE REPORTS

Project Report with Boring Information

Project Listing Page 1

St. Louis District, Corp of Engineers
Report created on Thursday, 03 September 1992 at 04:14PM

Project: Bawcomville Levee P2-1-234
Borings: 4
Client: Bacomville Municipality C-1-234-N
Site: Bawcomville Municipality and environs S-1-234-E
Contractor:
Latitude:
Longitude:
Northing: 1.23
Easting: 2.34
Directory: D:\WES\BLDM2\BAWCOM\
Data Files: Borings[BAWCOMB.DBF] Samples[BAWCOMS.DBF]

Boring	G.S.E.	Top Rock	Samples	Tests
BLB-1-88	61.3	48.4	6	T,S,C,R,Q
BLB-2-88	75.3		6	
BLB-3-88	73.9		6	
BLB-4-88	74.4		6	

Project: Sicily Island 5B RRW
Borings: 5
Client:
Site:
Contractor:
Latitude:
Longitude:
Northing:
Easting:
Directory: D:\WES\BLDM2\ISLAND5\
Data Files: Borings[ISLAND5B.DBF] Samples[ISLAND5S.DBF]

Boring	G.S.E.	Top Rock	Samples	Tests
SILS-29-88U			29	T,S,C,R,Q
SILS-30-88U			30	
SILS-31-88U			30	
SILS-32-88U			29	
SILS-33-88U			29	

APPENDIX E: EXAMPLE REPORTS

Boring Report

Boring Listing Page 1

St. Louis District, Corp of Engineers
Project: Bawcomville Levee
Report created on Thursday, 03 September 1992 at 04:27PM

Project:	Bawcomville Levee	P2-1-234
Borings:	39	
Client:	Bacomville Municipality	C-1-234-N
Site:	Bawcomville Municipality and environs	S-1-234-E
Contractor:		
Latitude:		
Longitude:		
Northing:	1.23	
Easting:	2.34	
Directory:	D:\WES\BLDM2\BAWCOM\	
Data Files:	Borings[BAWCOMB.DBF] Samples[BAWCOMS.DBF]	

Boring Listing Page 2

St. Louis District, Corp of Engineers
Project: Bawcomville Levee
Report created on Thursday, 03 September 1992 at 04:27PM

Boring Number:	BLB-1-88	
Client:	Bawcomville Municipality	2-345678901b
Site:	Southwest Mississippi	1-234567890a
Samples:	6	
Type:		
Rig Type:		
Location (1):		
Location (2):		
Field Book Number:	7364	
Date Taken:	11/04/1988 - 11/06/1988	
Northing/Easting:	1.20, 2.30	
Station/Offset:	21.20, 1290321.20	
Azimuth/Angle:	1.2300, 23.2000	
Alignment Name:		
Alt. Alignment #1/#2:	1.23, 3.43	
Ground Surface Elev:	61.3	
Depth to Refusal:	68.2	
Depth to Caving:	51.2	
Water Table Depth:	37.3 [11/05/1988]	
Top Rock Depth:	48.4	
Date Analyzed:	11/22/1988	
Date Checked:	11/28/1988	
Drilling Contractor:	J. Doe Drilling	
Driller:	Doe, John Q.	
Logger:	Smith, Bill S.	
Drilling Method:	AUG	
General Samples:	D25	
Undisturbed Samples:	COR	
Remarks:		
Backfill Date:	11/28/1988	
Backfill Contractor:	ACME Backfillers Ltd.	
Backfill Crew Chief:	Doe, Robert	
Remarks:		
Piezo/Well Number:	WELL-1	
Installation Date:	01/02/1988 - 01/03/1988	
Well Type:		
Test Method:	ARG	
Surface Protection:	Concrete	
Contractor:	ACME Drilling Ltd.	
Crew Chief:	Doe, Joe Q.	
Logger:	Doe, John E.	
Casing Type:	PVC	
Casing Diameter:	2.30	
Casing Height:	2.40	
Opening Size:	6.50	
Screen Type:	6# wire mesh	
Screen Depth:	12.0 - 18.4	

Boring Listing Page 3

St. Louis District, Corp of Engineers
Project: Bawcomville Levee
Report created on Thursday, 03 September 1992 at 04:27PM

Backfill Material

Top	Bottom	Type	Description
0.0	12.0	CEM	
12.0	28.0	COA	

Piezometer Annulus

Top	Bottom	Type	Description
0.0	1.0	BAS	
1.0	2.0	AGG	
3.0	4.0	AGG	
4.0	5.0	AGG	
5.0	6.0	CHA	
6.0	7.0	COA	
7.0	8.0	CH	
8.0	9.0	CON	
9.0	10.0	DIO	
10.0	11.0	GAB	
11.0	12.0	GM	
12.0	13.0	GNE	
13.0	14.0	GRA	
14.0	15.0	GRN	
15.0	16.0	CH	
16.0	17.0	CL	
17.0	18.0	CON	
19.0	20.0	CEM	

Cone Penetrometer

Depth	Type	Penetration	End_Bearing	Sleeve_Friction	Friction_Ratio
13.3	IJK	12.3	33.20	142.30	4.50

Core Boxes

Top	Bottom	Box Number	Box Size
0.0	6.0	1-2	6"

Boring Listing Page 4

St. Louis District, Corp of Engineers
Project: Bawcomville Levee
Report created on Thursday, 03 September 1992 at 04:27PM

Core Recovery

Top	Bottom	Recovery	RQD Recovery
0.0	12.0	11.2	9.2
24.0	32.0	7.2	

Water Levels

Date	Time	Depth	Technician
01/01/1989	13:55	23.0	Smith, Bob O.
07/08/1990		33.2	Dodgson, William E.

Geophysical Logs

Date	Top	Bottom	Type	Logger
01/02/1991	12.0	15.0	DIO	Doe, Alfred E.

Drilling Contractor: J. Doe Backfill Inc.

Laboratory Reports

Date	Laboratory Name Report Number
04/05/1988	ACME Laboratories PLC 1988-E.DACW.45.45

APPENDIX E: EXAMPLE REPORTS

Sample Report

```
Sample Listing                                                              Page  1

                        St. Louis District, Corp of Engineers
                           Project: Baucomville Levee
                              Boring: BLB-1-88
               Report created on Thursday, 03 September 1992 at 04:27PM
```

```
    Project: Baucomville Levee                     P2-1-234
    Borings: 39
     Client: Baucomville Municipality              C-1-234-R
       Site: Baucomville Municipality and environs S-1-234-E
 Contractor: J. Doe Drilling Inc.
   Latitude:
  Longitude:
   Northing:       1.23
    Easting:       2.34
  Directory: D:\WES\BLDMZ\BAUCOM\
 Data Files: Borings[BAUCOMB.DBF] Samples[BAUCOMS.DBF]

          Boring Number: BLB-1-88
                 Client: Baucomville Municipality           2-3456789010
                   Site: Southwest Mississippi              1-2345678900
                Samples: 6
                   Type:
               Rig Type:
           Location (1):
           Location (2):
      Field Book Number: 7364
             Date Taken: 11/04/1988 - 11/06/1988
       Northing/Easting:       1.20,        2.30
         Station/Offset:      21.20, 12345321.20
          Azimuth/Angle:     1.2300,     23.3000
         Alignment Name:
  Alt. Alignment #1/#2:        1.33,        3.43
    Ground Surface Elev:    61.3
      Depth to Refusal:    68.2
        Depth to Caving:    51.2
      Water Table Depth:    37.3  [11/06/1988]
         Top Rock Depth:    48.4
          Date Analyzed: 11/22/1988
           Date Checked: 11/28/1988
    Drilling Contractor: J. Doe Drilling
                Driller: Doe, John Q.
                 Logger: Smith, Bill S.
        Drilling Method: AUG
        General Samples: BGS
    Undisturbed Samples: COR
                Remarks:

          Backfill Date: 11/20/1988
    Backfill Contractor: ACME Backfillers Ltd.
    Backfill Crew Chief: Wild, Robert
                Remarks:

     Piezo/Well Number: WELL-1
      Installation Date: 01/02/1988 - 01/03/1988
              Well Type:
            Test Method: ABC
     Surface Protection: Concrete
             Contractor: J. Doe Drilling
             Crew Chief: Doe, Joe Q.
                 Logger: Doe, John E.
            Casing Type: PVC
        Casing Diameter:    2.30
          Casing Height:    2.40
           Opening Size:    6.50
            Screen Type: 60 wire mesh
           Screen Depth:    12.0 -     18.4
```

APPENDIX E: EXAMPLE REPORTS

Sample Listing — Page 2

St. Louis District, Corp of Engineers
Project: Gaucanville Levee
Boring: BLE-1-88
Report created on Thursday, 03 September 1992 at 04:27PM

Sample Number	Depth From	Depth To	Strat Chng	Typ	Adj Mod	Modifications	Colors	Cons	Dry Weight	W.C. Sampl	W.C. Test	1st LCT	2nd LCT	Liq Lmt	Pls Lmt	Shr Lmt	Lin Lmt	Specific Gravity
1	0.0	5.0		CH	SIS	GT	GN GR	ST	98.56	40%	40%	1111	2222	111	222	333	444	1111111
Notes:	Note 1 Note 2 Note 3 Note 4 Note 5																	
2	5.0	6.0	7.0	CH	SIS	GT	GR	ST	82.07	80%				222	222	333	444	
Tests:	C Gee, Allen G. X																	
Substrata:	0.0	1.0	CL															
3	10.0	11.0		SP		F	S W/	G	GR									
4	13.0	14.0	14.0	SP		F	S W/	G	GR	GR								
Tests:	Q Smith, Bill B. P Doe, Allen T Smith, Bill V																	
Substrata:	0.0 12.0	12.0 CH 24.0 CSN																
5	14.0	19.0	19.0	ASD		B												
Tests:	B S V X																	
Substrata:	0.0 12.0	12.0 ASD 24.0 BAS																
6	20.0	22.0	22.0	CHA														

Sample Number	Depth From	Depth To	Recover	Dril Rtn	Vane Shear	Typ	Perm Coef	Typ	Brazil Tensile	Hand Pene	Std Pene	Blow 1	Blow 2	Blow 3	Blow 4	Blow 5	Counts 1	Counts 2	Counts 3	Counts 4	Counts 5
1	0.0	5.0	1.2	CBR	1111111	V	1111111	K	1111111	1111111	100	50	30	50	50	75	1.20	2.20	3.40	4.50	5.60
2	5.0	6.0							21.3												
3	10.0	11.0																			
4	13.0	14.0																			
5	14.0	19.0		ASD																	
6	20.0	22.0		ASC																	

APPENDIX E: EXAMPLE REPORTS

Sample Listing — Page 3

St. Louis District, Corp of Engineers
Project: Beaucoup'ville Levee
Boring: BLB-1-88
Report created on Thursday, 03 September 1992 at 04:27PM

Sample number	Depth From	Depth To	D10	D25	D50	D60	D75	Gravel	Sand	Fines	Clay
1	0.0	1.0	10.0000	20.0000	30.0000	40.0000	50.0000	1.00	2.00	3.00	4.00
2	5.0	6.0									
3	10.0	11.0	0.1936								
4	13.0	14.0	0.3870								
5	14.0	16.0									
6	18.0	22.0									

Legend Report

Legend Page 1

St. Louis District, Corp of Engineers
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Soil and Rock Symbols

Symbol	Cell	Description
AGG	BREC	Agglomerate flow Breccia
AND	ANDE	Andesite
BAS	BASA	Basalt
CEM	CEMSHA	Cemented shale
CH	CH	Fat, inorganic clay of hi plasticity
CHA	CHAL	Chalk
CL	CL	Lean, sandy, silty clay, med plasticity
CLA	CLAY	Indurated clay or claystone
COA	COAL	Coal
CON	CONG	Conglomerate
DIO	DIOR	Diorite
DOL	DOLO	Dolomite
GAB	GABB	Gabbro
GC	GC	Clayey gravel, gravel-sand-clay
GM	GM	Silty gravel, gravel-sand-silt
GNE	GNEI	Gneiss
GP	GP	Gravel, poorly graded, gravel-sand mix
GRA	GRAY	Grayache
GRN	GRAN	Granite
GW	GW	Gravel, well graded, gravel-sand mix
LIM	LIME	Limestone
MAR	MARB	Marble
MH	MH	Silt, fine sandy/silty soil, hi plas
ML	ML	Silt, very fine sand, clayey fine sand
OH	OH	Organic clays, silts of med to hi plas
OL	OL	Lean, sandy, silty clay, med plasticity
PT	PT	Peat or other highly organic soil
QUA	QUAR	Quartzite
RHY	RHYO	Rhyolite
SAN	SAND	Sandstone
SC	SC	Clayey sand, sand-silt mixtures
SCH	SCHI	Schist
SHA	COMSHA	Compacted shale
SLA	SLAT	Slate
SM	SM	Silty sand, sand-silt mixtures
SOA	SOAP	Soapstone
SP	SP	Sand, poorly graded, gravelly sand
SW	SW	Sand, well graded, gravelly sand
TUF	TUFF	Tuff or Tuff Breccia
WD	WOOD	Wood

Color Symbols

Symbol	Text	Description
BK	Bk	Black

Legend Page 2

St. Louis District, Corp of Engineers
Report created on Thursday, 03 September 1992 at 04:28PM

Color Symbols

Symbol	Text	Description
BL	Bl	Blue
BLG	BlGn	Blue-green
BR	Br	Brown
BRG	brGr	Brownish-gray
DBR	dBr	Dark brown
DGR	dGr	Dark gray
GN	Gn	Green
GNG	GnGr	Greenish-gray
GR	Gr	Gray
GYB	GyBr	Grayish-brown
GYG	GyGn	Grayish-green
LBR	lBr	Light brown
LGR	lGr	Light gray
MOT	Mot	Mottled
R	R	Red
RD	rd	Reddish
T	T	Tan
WH	Wh	White
Y	Y	Yellow

Modification Symbols

Symbol	Text	Description
TR	Tr-	Traces
F	F	Fine
C	C	Coarse
CC	cc	Concretions
RT	Rt	Rootlets
LG	Lg	Lignite fragments
SH	sh	Shale fragments
SDS	sds	Sandstone fragments
SLF	slf	Shell fragments
O	O	Organic matter
OX	Ox	Oxidized
CS	CS	Clay strata or lenses
SIS	SIS	Silt strata or lenses
S	S	Sandy
G	G	Gravelly
B	B	Boulders
SL	SL	Slickensides
WD	Wd	Wood
SSI	SSIS	Sandy silt
ISS	SISS	Silty sand
VEG	Veg	Vegetation
SS	SS	Sand strata

Legend Page 3

St. Louis District, Corp of Engineers
Report created on Thursday, 03 September 1992 at 04:28PM

Modification Symbols

Symbol	Text	Description
SI	SI	Shells
CR	CR	Crumbly
W/	w/	With
W	w/	With
LO	Lo	Loose
VD	vD	Very dense
D	D	Dense
SIF	SIF	Shell fragments
PGM	GPGM	Poorly graded silty fine gravel
WGM	GWGM	Well graded silty fine gravel
PGC	PGC	Poorly graded clayey fine gravel
WGC	GWGC	Well graded clayey fine gravel
PSM	SPSM	Poorly graded silty fine sand
PSC	PSC	Poorly graded clayey fine sand
WSM	WSM	Well graded silty fine sand
WSC	WSC	Well graded clayey fine sand
LML	CLML	Silty sand
TR-	Tr-	Traces

Consistency Symbols

Symbol	Text	Description
VSO	vSo	Very Soft
SO	So	Soft
M	M	Medium
ST	St	Stiff
VST	vSt	Very Stiff
H	H	Hard

Drilling Method Symbols

Symbol	Tool Diameter	Description
RM		Rotary Mud
RNM		Rotary No Mud
AUG		Auger
HDA		Hand Auger
FT4	4.0 IN	4" Fishtail
FT6	6.0 IN	6" Fishtail
D25	2.5 IN	2.5" Drive Tube
SSS		Standard Split Spoon
VST		Vacuum Shelby Tube
DEN		Denison
COR		Core

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St. Louis District, Corp of Engineers
Report created on Thursday, 03 September 1992 at 04:28PM

Drilling Method Symbols

Symbol	Tool Diameter	Description
RRB		Roller Rock Bit
HVO		Hvorslev

Lab and Field Test Symbols

Symbol	Cell Name	Code	Type	Description
T	4TSTS	T	Lab	T - Four tests
S	CDDSHR	S	Lab	S Test
C	CTST	C	Lab	C Test
R	CUTRX	R	Lab	R Test
Q	UUTRX	Q	Lab	Q Test

APPENDIX E: EXAMPLE REPORTS

INSITU Data File

```
;
;Boring Log Data Manager v2.00c
;INSITU data file created on Thursday, 03 September 1992 at 05:27PM
;Project: Bawcomville Levee
;

;
;Start of data for Boring BLB-1-88, 6 samples.
;


REMOVE_BORING

NUM  // BLB-1-88
PRJ  // Bawcomville Levee

ADD_BORING

BEGIN GENERAL

NUM  // BLB-1-88
SIT  // Southwest Mississippi
SITN // 1-234567890a
PRJ  // Bawcomville Levee
PRJN // P2-1-234
CLI  // Bawcomville Municipality
CLIN // 2-345678901b
STAR // 11/04/1988
DONE // 11/06/1988
CO   // J. Doe Drilling Inc.
DRL1 // John
DRL2 // Q
DRL3 // Doe
LOG1 // Bill
LOG2 // S
LOG3 // Smith
LOC  // SEE MAP
NS   // 1.20
EW   // 2.30
ELV  // 61.3
STN  // 21.20
OFF  // 1290321.20
ALT1 // 1.2
ALT2 // 3.4
AZM  // 1.2300
ANG  // 23.2000
DEP  // 22.0
CAV  // 51.2
ROK  // 48.4
WAT  // 37.3
REF  // 68.2
UNT  // FT
REM  // Auger
REM  // FIELD BOOK NO: 7364
REM  // GENERAL SAMPLES: 2.5" Drive Tube
REM  // UNDISTURBED SAMPLES: Core

BEGIN HAND_PEN

READ // 1111111.00
TOP  // 0.0
BOT  // 1.0

BEGIN VANE

READ // 1111111.00
TYPE // V
TOP  // 0.0
BOT  // 1.0
```

```
BEGIN SPT

NVAL // 100
CNT1 // 10
CNT2 // 50
CNT3 // 50
PEN1 // 1.20
PEN2 // 2.30
PEN3 // 3.40
UNT  // BLOWS/FT
TOP  // 0.0
BOT  // 1.0

BEGIN CONE

NVAL // 123
TYPE // IJK
END  // 33.20
SLV  // 142.30
FRIC // 4.50
DEP  // 13.3

BEGIN LAB_TST

TYPE // C Test
FIR  // Allen
MID  // O
LAST // Doe
TOP  // 5.0
BOT  // 6.0

BEGIN BOXES

NUM  // 1-2
SIZE // 6"
TOP  // 0.0
BOT  // 6.0

BEGIN CORE

REC  // 11.2
RQD  // 9.2
UNT  // FT
TOP  // 0.0
BOT  // 12.0

BEGIN METHOD

TOOL // Core
TOP  // 0.0
BOT  // 5.0

BEGIN WATER

LEV  // 23.0
DATE // 01/01/1989
TIME // 13:55
FIR  // Bob
MID  // O
LAST // Smith

BEGIN PERM

TYPE // X
VAL  // 1111111.0
UNT  // FT/DAY
TOP  // 0.0
BOT  // 1.0

BEGIN LOGS

TYPE // DIO
CO   // J. Doe Backfill Inc.
```

```
CO   // J. Doe Backfill Inc.
FIR  // Alfred
MID  // E
LAST // Neumann
DATE // 01/02/1991
TOP  // 12.0
BOT  // 15.0

BEGIN LAB

NUM  // 1988-E.DACW.45.45
DATE // 04/05/1988
NAME // ACME Laboratories PLC

BEGIN STRATA

TOP  // 0.0
BOT  // 7.0
TYPE // CH
DES  // Fat, inorganic clay of hi plasticity

BEGIN STRATA

TOP  // 7.0
BOT  // 14.0
TYPE // SP
DES  // Sand, poorly graded, gravelly sand

BEGIN STRATA

TOP  // 14.0
BOT  // 18.0
TYPE // AND
DES  // Andesite

BEGIN STRATA

TOP  // 18.0
BOT  // 22.0
TYPE // CHA
DES  // Chalk

BEGIN SUBSTRATA

TOP  // 0.0
BOT  // 1.0
DES  // CL
DES  // Lean, sandy, silty clay, med plasticity

BEGIN SAMPLES

PUSH // 1.0
TOP  // 0.0
BOT  // 1.0
CLASS// CH
DES  // Fat, inorganic clay of hi plasticity
DES  // St
DES  // Gr&Br
DES  // SIS,Rt

BEGIN SAMPLES

PUSH // 1.0
TOP  // 5.0
BOT  // 6.0
CLASS// CH
DES  // Fat, inorganic clay of hi plasticity
DES  // St
DES  // Gr
DES  // SIS,Rt

BEGIN SAMPLES
```

```
PUSH // 1.0
TOP  // 10.0
BOT  // 11.0
CLASS// SP
DES  // Sand, poorly graded, gravelly sand
DES  // Gr
DES  // F,M,w/G

BEGIN SAMPLES

PUSH // 1.0
TOP  // 13.0
BOT  // 14.0
CLASS// SP
DES  // Sand, poorly graded, gravelly sand
DES  // Br&Gr
DES  // F,M,w/G

BEGIN SAMPLES

PUSH // 4.0
TOP  // 14.0
BOT  // 18.0
CLASS// AND
DES  // Andesite
DES  // D

BEGIN SAMPLES

PUSH // 4.0
TOP  // 18.0
BOT  // 22.0
CLASS// CHA
DES  // Chalk

BEGIN CLS_TST

DEP  // 0.0
MC   // 46
DEN  // 98.56
SPG  // 1111111.00
LL   // 111
PL   // 222
SL   // 333
LS   // 444
GRAV // 1.00
SAND // 2.00
FINE // 3.00
CLAY // 4.00
D75  // 50.0000
D60  // 40.0000
D50  // 30.0000
D25  // 20.0000
D10  // 10.0000

BEGIN CLS_TST

DEP  // 5.0
MC   // 50
DEN  // 82.87
LL   // 222
PL   // 222
SL   // 333
LS   // 444

BEGIN UCC

VAL  // 1111
UNT  // PSI
TOP  // 0.0
BOT  // 1.0
```

```
VAL  // 1111111.0
UNT  // LBS/FT2
TOP  // 0.0
BOT  // 1.0

BEGIN BACKFILL

CO   // ACME Backfillers Ltd.
FIR  // Robert
LAST // Hild
DATE // 11/28/1988
REM  // It's filled back

BEGIN MATERIAL

TYPE // Cemented shale
TOP  // 0.0
BOT  // 12.0

BEGIN MATERIAL

TYPE // Coal
TOP  // 12.0
BOT  // 28.0

BEGIN PIEZ

NUM  // WELL-1
TEST // ARG
PROT // Concrete
STAR // 01/02/1988
DONE // 01/03/1988
CO   // J. Doe Drilling Inc.
FOR1 // Joe
FOR2 // Q
FOR3 // Doe
LOG1 // John
LOG2 // E
LOG3 // Doe
CAS  // PVC
DIAM // 2.30
UNT  // FT
HGT  // 2.40
SCRN // 6# wire mesh
SLOT // 6.50
TOP  // 12.0
BOT  // 18.4
TRAP // 17.2

BEGIN ANNULUS

TYPE // BAS
TOP  // 0.0
BOT  // 1.0

BEGIN ANNULUS

TYPE // AGG
TOP  // 1.0
BOT  // 2.0

BEGIN ANNULUS

TYPE // AGG
TOP  // 3.0
BOT  // 4.0

BEGIN ANNULUS

TYPE // AGG
TOP  // 4.0
BOT  // 5.0
```

```
BEGIN ANNULUS

TYPE // CHA
TOP  // 5.0
BOT  // 6.0
```

APPENDIX F: CONVERTING EXISTING DATABASE FILES

1. BLDM is supplied with a utility for converting data files created using the older Boring Log Database System as well as previous versions of BLDM. The utility (BLDMCVRT) is a command-line program which is used to process data files for a single project at a time. You may also use the program to convert project files (i.e., BLDMPROJ.DAT) to the new BLDM format. BLDMCVRT creates boring and sample data files in BLDM format from the older boring, sample, and remark data files. It creates a log file containing details of the conversion, including the names of files converted and any warnings or errors encountered during the process. Syntax for BLDMCVRT is as follows:

BLDMCVRT [*options*] [*old file spec*] [*new file spec*] [*dir spec*].

2. You must run BLDMCVRT from the directory containing the old data files. The *old file spec* is the seven-character filename root of the old data files to be converted. The *new file spec* is the seven-character filename root you want to use for the newly created files. The optional *dir spec* lets you specify a directory for the newly converted data files. The file specifications must be different unless you include the optional direcotory specification.

3. BLDMCVRT has two command-line options which may be specified on the DOS command line when you run the program. These options include:

-l: Specify BLDMCVRT log file

Purpose: BLDMCVRT normally writes log information to an ASCII text file named BLDMCVRT.LOG. Users may specify a different log file with this option.

-h: Display a help screen describing how to use BLDMCVRT and exit.

-p: Convert project files instead of boring data files. The old and new filename specifications should refer to project files when used with this option.

Examples:

1) Convert MYPROJ*.DBF data files onto directory MYDIR using log file MYLOG:

BLDMCVRT -l MYLOG MYPROJ MYPROJ \MYDIR

2) Convert MYPROJ*.DBF data files, creating files named NEWPROJ*.DBF in the current directory:

BLDMCVRT MYPROJ NEWPROJ

4. Once you have successfully converted the data files you may add the project to the BLDM project database. Specify the directory and 7-character filename root you used when converting the data files. Since the files already exist, instruct BLDM to use them when you add the project. You may, if you prefer, create the project before converting the files - BLDMCVRT will then simply overwrite the empty files created by BLDM when you added the project. Be sure and specify the project directory when you convert files using this approach.

APPENDIX G: NOTES ON USING BLDM

Normal Procedure

1. These are the typical steps to follow when creating project data:
    a) Create the project using *Data->Project->Add*.
    b) Create and enter boring data using *Data->Boring->Add*. If the boring has a piezometer well, enter this information also, using the boring form piezometer field.
    c) Create and enter boring sample data using *Data->Sample->Add*.
    d) Enter any INSITU data (i.e., piezometer annulus, core box, core recovery, etc.) for the boring.
    e) Repeat steps b) through d) for all project borings.

2. Use the appropriate edit and delete sub-menus to modify or remove project data for projects that have already been created.

3. If you do not plan to use the BLDM INSITU features, set the data entry orientation to 'plate orientation' using *Configure->System->Orientation*. This will reduce the number of data fields on the boring and sample data entry forms, giving you less-cluttered screens to work with.

Entering Strata Changes With Sample Data

To define each strata that the boring penetrates at least one sample must be entered into the database even if no sample was physically obtained. The bottom depth of the strata is kept in the sample record and must be entered for the plot routine to know where the next strata break is. Figure G1 illustrates the following three examples:

a) For a strata where no physical sample was obtained, a record of NS (No Sample) must be added. This will allow for the next stratum change depth to be added in the stratum change field.

b) For strata with multiple samples, only the last sample will have a value in the stratum change field. The samples previous to the last sample should have a zero value in

the stratum change field.

c) The last sample in the boring should have the bottom depth of the boring in the stratum change field to signify the end of the boring if the plotting routines.

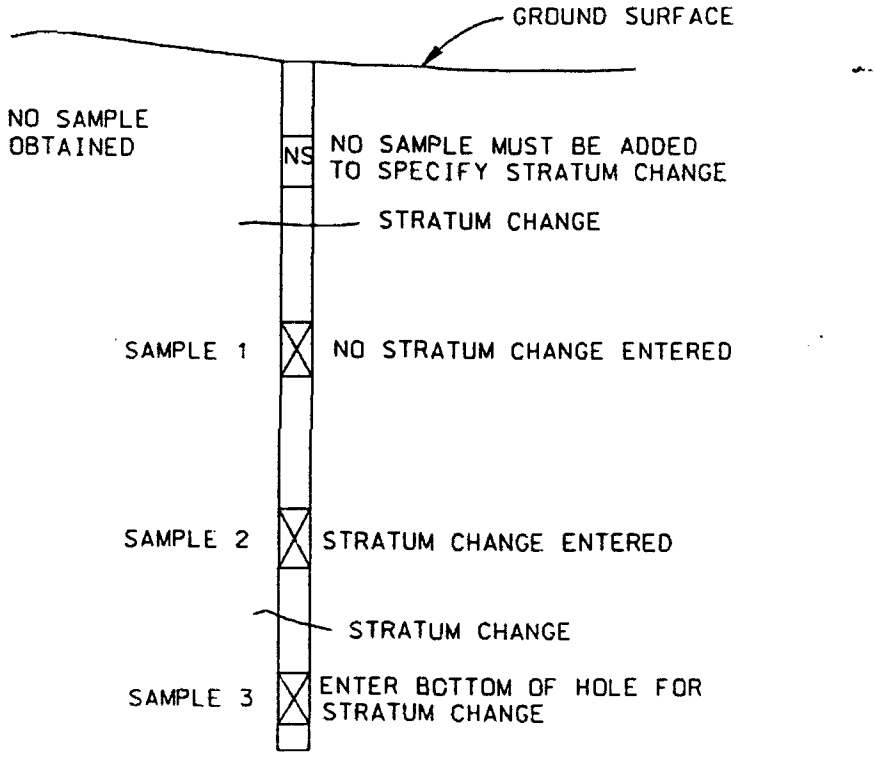

Figure G1 Examples of Specifying Stratum Changes with Sample Data

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13. ABSTRACT (Maximum 200 words)

The U.S. Army Engineer Waterways Experiment Station (WES) contracted with Nash Computing Services (NCS) to research, design, and develop a Boring Log Database Manager (BLDM) as a database management and site characterization tool for use by geotechnical engineers. The PC-based BLDM program allows users to maintain a complete boring log database for multiple projects. The system can be used to create data files for use with the Intergraph INSITU system. In addition, BLDM has the capability of creating boring log plates in MicroStation design file format using Corps-standard soil and rock symbology. These design files may be modified and plotted on any Intergraph platform (i.e., PCs or UNIX workstations running MicroStation or VAX minicomputers running IGDS). BLDM combines the functionality of the Boring Log Database System and Boring Log Design File Builder, two separate geotechnical applications programs formerly available to Corps offices in Miscellaneous Paper ITL-91-2 and Instruction Report GL-92-2.

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	Title	Date
Miscellaneous Paper GL-79-19	Results of Geotechnical Computer Usage Survey	Aug 1979
Miscellaneous Paper GL-82-1	Geotechnical Computer Program Survey	Mar 1982
Instruction Report GL-83-1	Geotechnical Construction Control Data Base System	Apr 1983
Instruction Report GL-84-1	Boring Information and Subsurface Data Base Package, User's Guide	Sep 1984
Miscellaneous Paper GL-85-8	Criteria for Limit Equilibrium Slope Stability Program Package	May 1985
Instruction Report GL-85-1	Microcomputer Boring and Subsurface Data Package, User's Guide	Sep 1985
Instruction Report GL-85-2	Piezometer Data Base Package, User's Guide	Oct 1985
Instruction Report GL-87-1	User's Guide: UTEXAS2 Slope-Stability Package; Volume I, User's Manual	Aug 1987
Miscellaneous Paper GL-87-5	An Examination of Slope Stability Computation Procedures for Sudden Drawdown	Sep 1987
Instruction Report GL-87-1	User's Guide: UTEXAS2 Slope-Stability Package; Volume II, Theory	Feb 1989
Miscellaneous Paper SL-91-2	Evaluation of "SeeSTAT" Software Program for Archiving, Computing, and Reporting of Concrete Test Results	May 1991
Miscellaneous Paper ITL-91-2	Geotechnical Application Programs for CADD (Computer-Aided Design and Drafting) Systems	Apr 1991
Instruction Report GL-91-2	Microcomputer Geotechnical Quality Assurance of Compacted Earth Fill Data Package: User's Guide	Aug 1991
Instruction Report GL-92-2	User's Guide for the Boring Log Design File Builder, Version 2.01	May 1992
Miscellaneous Paper GL-92-31	McCON–A General Contouring Program for Personal Computers	Sep 1992
Instruction Report GL-87-1	User's Guide: UTEXAS3 Slope-Stability Package; Volume IV, User's Manual	Nov 1992
Instruction Report GL-87-1	User's Guide: UTEXAS3 Slope-Stability Package; Volume III, Example Problems	Dec 1992
Contract Report GL-93-1	User's Guide for the Boring Log Data Manager, Version 2.0	Jul 1993